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VOL. XXVII No. 10

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A MONTHLY MAGAZINE AND REVIEW

FOR THE SCHOOL-ROOM AND THE STUDY

Vol. XXVII. No. 10. **APRIL, 1907.** **Price 6d.**

DR. AND MRS. MACNAMARA.
(Photo by Weston, Poultry, E.C.)

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BY EDMUND A. GREENING LAMBORN.

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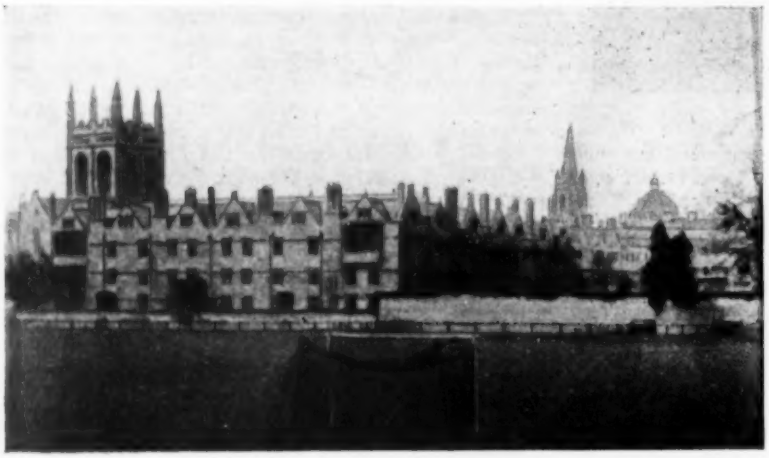
and his master by Holbein; Dr. Fell by Lely; Locke, specially interesting to educators, by Kneller; and the great Dean Aldridge, who rebuilt All Saints Church in 1709, by the same artist. There are Romney's portrait of Wesley; Reynolds's of Dean Markham; and, to come to modern times, Gladstone's portrait by Sir J. E. Millais, and "Lewis Carroll's," Pusey's, and Liddon's by Herkomer. The portraits in the stained-glass windows are also of great interest. The two other quadrangles of Christ Church—Peckwater and Canterbury quads—are entered from the north-east of Tom Quad. On the right of the first is the library (admission threepence), which contains many rare pictures of the early Italian school by Cimabue, Titian, Tintoretto, Paul Veronese, Andrea del Sarto, Leonardo da Vinci, and Salvator Rosa, and some interesting statuary. Canterbury quadrangle occupies the site of a hall of the same name, of which Wycliffe was once warden and Sir Thomas More a student. Passing out under Wyatt's classic gateway we see Oriel College in front and Corpus Christi College to the right. At Oriel, Raleigh and the Puritan Prynne were students, and in later days Pusey, Newman, and Keble were fellows. Their portraits may be seen in the hall.



MERTON COLLEGE AND GARDENS.

Passing Corpus Christi we reach Merton, the oldest of the Oxford colleges both as to foundation and buildings. It was founded in 1264 by Walter de Merton, Lord High Chancellor to Henry the Third, and the chapel with its early Decorated tracery is the one then built. Its stained glass is also of the thirteenth century. The tower, however, was not completed till the fifteenth century, and is beautiful Perpendicular. The nave and transepts were planned, as may be seen by the arches built to lead into them, but were never finished. Space forbids one to speak of the hall and library and the beautiful Jacobean buildings overlooking Christ Church meadow. The view from the garden terrace of Merton, which runs along the old wall of the city, is one of the most beautiful in all Oxford. In the bastion in the garden the cannon of Charles the First were placed, commanding Magdalen Bridge, which, with the famous tower of that college, can be seen to the left, across the Botanic Gardens (open free, eight to six). Magdalen, both by nature and art the most beautiful of the colleges, was founded in the reign of Edward the Fourth (who, with Richard the Third, visited it) and completed in the reign of Henry the Seventh. The great bell-tower was formerly supposed to have been built by Wolsey, who was then junior bursar. At the back of the college is the grove with its deer, and to the right are the delectable water walks where Addison loved to stroll and muse.

Returning up the High Street we pass the new Examination Schools on the left, containing a fine collection of the portraits of English musicians, and Queen's College, with its classic façade, on the right. Here the Black Prince and the warrior king Henry the Fifth were educated, the college taking its name from the former's mother. In the hall, designed by Wren, the ancient ceremony of bringing in the boar's head with a carol is observed every Christmas Day. The custom commemorates the escape of a scholar of the college who, being attacked by a boar on Shotover Hill, thrust his volume of Aristotle down the throat of the beast, and so choked him; or if that is not the origin of the ceremony, no other is known. On the left of High Street is University College, *not* founded by Alfred the Great, though having really reached the ripe old age of six hundred and some odd years. The High Street front was built in the seventeenth century, in the years when the king and court were at Oxford during the Civil War. Charles was lodged in Christ Church, and Henrietta in Merton, and courtiers and statesmen occupied the rooms of the scholars. There were more swords in Oxford than pens, and Town and Gown alike laboured at the fortifications by which the city was defended on all sides. But the acts of King Charles the Martyr, and of Rupert, Falkland, and Goring, and all that they then did, are they not written in the book of Oxford's historian, Antony Wood? And if the perusal of his somewhat ponderous volumes be too serious a preparation for a week which must necessarily be over-full of business for the delegate, there is James Shorthouse, who will make the graven gargoyles of Oxford speak with tongues for those who come with *John Inglesant* fresh in the memory. Perhaps the most famous son of University College is the one she rejected, not so much, in truth, for his freethought as for his freedom of speech towards his pastors and masters, the dons. His memorial, by Onslow Ford, lies to the right on entering, under a leaden dome.

Opposite "Univ." is All Souls—*Collegium Omnium Animarum Fidelium Defunctorum*, and especially of the souls of Henry the Fifth, King of England and France, and of his subjects who fell in the French war. The "souls" are pictorially represented over the doorway as awaiting in purgatory the judgment day. The reredos in the chapel represented the king and his Agincourt heroes, but it was ruined by the Puritan "visitors" of Edward the Sixth and recently restored.

St. Mary's, already spoken of as the University Church, adjoins All Souls. The Decorated spire is the most beautiful in England. Of all the many memories of the church one can only mention three. Amy Robsart is buried in the choir, as an inscription on a

marble slab in the floor of the chancel will inform the lover of *Kenilworth*, who, as Cumnor is only four miles to the west, may also visit the church where she worshipped in life, which contains many memorials of her and Leicester and his jealous mistress. In this Church of St. Mary, Wycliffe in his day and Newman (from the present pulpit) in his preached sermons which profoundly affected subsequent religious thought in the nation. To the pillar opposite the pulpit Cranmer was chained when he was brought here publicly to recant his "heresies." Here he confounded his enemies by "flinging down the burden of the shame" of his momentary weakness, and declaring himself entirely opposed to the Pope and his false doctrines. We may pause to follow the old man in his ragged gown, hustled back by his persecutors to his prison in Bocardo, adjoining the Saxon tower of St. Michael on the city wall. The heavy door of that prison may still be seen in St. Mary Magdalene Church, the north aisle of which was rebuilt as a memorial of the martyrs, and contains heads of Cranmer and his fellows carved in the corbels of its doorway. Below the north front of the city wall ran the Canditch or moat, now Broad Street, and beyond was, and is, Balliol College, then in the open fields. Somewhere near the cab shelter in Broad Street (a stone cross in the ground marks the spot where a layer of wood ashes were uncovered some years ago) Ridley and Latimer were burned, lighting at their fire that "candle in England" which has not yet been put out; and Cranmer was forced to stand at one of the bastions overlooking the bank of the moat to suffer the agony of burning beforehand by sympathy and anticipation. How, when his turn came, he kept his promise and gave first to the flame that hand which had offended, will be recalled by all who stay to look on the steadfast face of his statue on the north side of the martyrs' memorial. Ridley looks east, and the bent and aged Latimer towards the declining sun.

At the back of St. Mary's Church is a group of buildings which belong to the university as distinct from the individual colleges. Towering above all, in the centre of the square, is the great dome of the Radcliffe Camera, built by Gibbs, in 1750, at the cost of Dr. Radcliffe, physician to William the Third. It was originally a physic library, but the medical books have been removed to the scientific library at the University Museum, and it now forms the reading-room of the Bodleian Library, which is one of a group of late Gothic buildings to the north. Here, in addition to a million books, may be inspected (admission threepence) many rare manuscripts, a copy-book of Queen Elizabeth and one of her brother Edward the Sixth, a chair made from the wood of the *Golden Hind*, an autograph of Shakespeare, the copy of Sophocles found in the pocket of the drowned Shelley; and in the picture gallery paintings by Holbein, Van Dyck, Lely, and many statues and busts. In the Divinity School (fee threepence), beneath the library, the House of Commons sat, in 1625, when driven from London by the Plague. Here also Ridley and Latimer stood their "trial" before the commissioners of Cardinal Pole. The round classic building, with its half-circle of grotesque heads, is the Sheldonian Theatre designed by Wren in 1665. Here the honorary degrees of the university are conferred, and among the great men of the world who have stood beneath its painted roof may be mentioned Nelson in 1802, and Lord Curzon a hundred years later. A comprehensive and easily-obtained view of Oxford can be gained from the many-windowed room at the top of the Sheldonian.

To the west of this building is the Old Ashmolean, now the Geography School, which contained a collection of curiosities collected by John Tradescant in the reign of Charles the Second, which formed a popular London "show" at that day. It was acquired and bequeathed to the university by Elias Ashmole, and may now be seen in the Taylorian Buildings in Beaumont Street (admission threepence). Here are the dark-lantern of Guy Fawkes; a jewel of Alfred's with his picture, found in the Isle of Athelney; the sword given by the Pope to Henry the Eighth as "Defender of the Faith." But to the artist and student these are the least interesting of the wonderful contents of the Taylorian Buildings. The art collections of paintings by Millais, Collins, and Holman Hunt, Fra Lippo Lippi and Gentile Bellini, the water-colours by Turner, and the drawings by Raphael and Michael Angelo, with the statuary on the basement floor, will afford the art lover many a delightful hour; and for the anthropologist the collections of relics of primitive man is probably unequalled in England.

Opposite Keble College (in Parks Road), with its famous Holman Hunt picture "The Light of the World," is another museum containing many interesting collections.

I am already overstepping my prescribed limits of space, yet I seem to have left three parts of my tale untold. I have said nothing of William of Wykeham's "New College," the earliest example of a building in the Perpendicular style. Round two sides of its beautiful garden runs the city wall, erected in the reign of Henry the Third. It should be inspected also from the outside. I may not do more than mention Exeter College, in the Turl, with its Burne-Jones tapestry and the great chestnut tree in its garden, called after the prelate-poet Heber, whose rooms in Brasenose it overshadows.

I cannot have it on my conscience that one visitor to Oxford should miss, for want of reminder, the beautiful Jacobean colleges of Wadham and St. John's, which rival each other and Worcester for the credit of possessing the most beautiful gardens in Oxford. Mr. Lang thinks "the garden front of St. John's the most lovely thing in Oxford." Here it is of the greatest importance to impress upon the stranger to Oxford that the fact of a college gate being open is to be understood as an invitation to enter. All the quadrangles and gardens are free to the inspection of all. Admission to all the college chapels is free, within certain limits of time, and the dining-halls and libraries may be inspected for a small fee in almost every case. Information as to whom to apply to, in the case of those who wish to see the halls or rooms, can always be obtained from the porter in the lodge at the gate.

From the variety of literature on "Oxford" one or two books may be mentioned as eminently suitable for perusal by those who, making but a short sojourn in Oxford, are yet desirous of carrying away something more than the memory of a beautiful panorama. There are the charming sketches from the twelve centuries of Oxford's existence in Mr. Andrew Lang's *Oxford* (Seeley and Co., 3s.), and for those who wish for more detail there is *Oxford and Its Colleges*, by Mr. J. Wells (Methuen and Co., 2s. 6d.). Both these books would form most appropriate souvenirs of "Conference Week in Oxford."

Visitors to the Oxford Conference should ask at Messrs. Nelson's Stall to see *Highways of History*.

EDUCATIONAL OPINION

EDUCATION IN PARLIAMENT.

IT was a dream—it was too good to be true—it was too good to last—the idea that there was to be no Education Bill in Parliament this year, either for England and Wales or for Scotland. Yet that was the hope which the King's Speech held out to us all—fallaciously. Fallaciously, of course, because a new President of the Board of Education cannot be expected to be content without an Education Bill to bring forward. There *is* a new President of the Board of Education. Mr. Birrell has "gone to Ireland." Mr. Birrell was a success as President of the Board of Education in all but one respect, and that was, unfortunately, the most important: he was not a success as an administrator. It remains to be seen what will be the strong points of his successor, Mr. M'Kenna. There was a hope—a fleeting, rainbow hope—that he would have time and chance to devote himself to administration. He may do that even yet; but he has already brought in two Education Bills, and it is not yet Easter.

The schools are *not* to be treated as are preserves and useful and interesting semi-wild animals—no close time is to be allowed them. Mr. M'Kenna's first Bill shows that. Here is the operative text of it:—

A Bill to make provision for relieving the local education authority of the cost of giving Special Religious Instruction in schools not provided by the authority.

The managers of every public elementary school maintained but not provided by a local education authority in which religious instruction which would not be permissible in a school provided by the authority under section fourteen of the Elementary Education Act, 1870, has been given during the financial year ending the *thirty-first day of March nineteen hundred and seven*, or during any subsequent financial year, shall, within six months after the expiration of that year, pay to the authority a sum equal to one-fifteenth part of the sum paid during the year in salaries to the teachers who have been employed in the school and have given that instruction: provided that where a teacher has given that instruction in a school during part only of the year, the sum to be paid in respect of that teacher shall be proportionately reduced.

The managers of a school shall not, by reason of this Act, be under any personal liability to pay any such sums to the authority; but one of the conditions to be fulfilled in order to enable a school not provided by the local education authority to be maintained by that authority, and to be a school in respect of which parliamentary grants are payable, shall be that the provisions of this section are complied with in respect of the school.

If any question arises under this Act between the local education authority and the managers of the school, that question shall be determined by the Board of Education, whose decision shall be final; and where any such question is raised, the provisions of this Act prohibiting the maintenance of the school by the authority and the payment of parliamentary grants shall not take effect until one month after the question is so decided.

That Bill is not one-fifteenth of the size of the Bill of 1906, but it will cause a good deal more than one-fifteenth as much bother—if it is proceeded with, that is. There is quite an impression that it may not be gone on with this year. Adopting a very unusual course, the Irish members who are Roman Catholics demanded a division, and voted against the Bill on the first reading; and Mr. Balfour prophesied future antagonism from the Opposition. Voluntary school managers will have more cause than ever, if this Bill becomes law, to regret the folly of their champions in not accepting the Bill of Mr. Birrell. And teachers, too, will have more cause for such regret, unless compensation for employment clauses, like those which appeared in last year's Bill, can be inserted in this measure; because if this Bill becomes operative, Voluntary schools will be closed by the hundred, and in many a school not closed that one-fifteenth of the salary will (privately) come out of the pockets of yielding teachers.

Happily there is much less of contention about Mr. M'Kenna's second proposal. Here are the essentials of it—a page and a half of clauses about purchase and appropriation of school sites, consent of the Board of Education, and extension of repayment period for loans from thirty years to sixty years as the maximum, etc., being here omitted:—

The limit on the amount which may be raised by the council of a county for the purposes of education other than elementary under section two of the Education Act, 1902, shall cease to operate.

For the purposes of the Education Acts, the providing, or aiding the provision of, any training or instruction of any kind whatever, and any like purpose which the Board of Education determine to be an educational purpose, shall be deemed to be educational purposes; and the expression "education" in those Acts shall be construed accordingly.

The power of a council to provide scholarships for or pay the fees of students under subsection two of section twenty-three of the Education Act, 1902, shall include a power, subject to such conditions (if any) as may be made by the council, to provide or assist in providing scholarships for, or to pay or assist in paying the fees of, students, if at the time the scholarship is awarded or the payment of the fees is determined upon the student is ordinarily resident in the area of the council, although he subsequently ceases to be so resident.

The powers and duties of a local education authority under Part III. of the Education Act, 1902, shall include a power to aid by scholarships or bursaries the instruction in public elementary schools of scholars from the age of twelve up to the limit of age fixed for the provision of

instruction in a public elementary school by subsection two of section twenty-two of that Act.

The powers and duties of a local education authority under Part III. of the Education Act, 1902, shall include :—

(*a*) Power to provide, for children attending a public elementary school, vacation schools, vacation classes, play centres, or means of recreation during their holidays or at such other times as the local authority may prescribe, in the schoolhouse or in some other suitable place in the vicinity, so far as the local education authority in the case of a schoolhouse or place not belonging to them can obtain for the purpose the use of the schoolhouse or place ; and

(*b*) The duty to provide for the medical inspection of children before or at the time of their admission to a public elementary school, and on such other occasions as the Board of Education direct, and the power to make such arrangements as may be sanctioned by the Board of Education for attending to the health and physical condition of the children educated in public elementary schools.

Provided that in any exercise of powers under this section the local education authority may encourage and assist the establishment or continuance of voluntary agencies, and associate with itself representatives of voluntary associations for the purpose.

When a local education authority provide means of conveyance for a child between a reasonable distance of its home and a public elementary school, it shall not be a reasonable excuse for the purposes of section seventy-four of the Elementary Education Act, 1870, or section eleven of the Elementary Education Act, 1876, or a ground of exemption for the purposes of section nine of the latter Act, that there is no public elementary school open which such child can attend within the distance of its residence prescribed by those sections or by any by-law made under section seventy-four of the Elementary Education Act, 1870.

The county council may incur expense in providing means of conveyance for teachers or children attending a public elementary school.

Any obligation to frame, form, or keep a register of teachers under paragraph (*a*) of section four of the Board of Education Act, 1899, shall cease : Provided that it shall be lawful for His Majesty by Order in Council to constitute a registration council representative of the teaching profession, to whom shall be assigned the duty of forming and keeping a register of such teachers as satisfy the conditions of registration established by the Council for the time being, and who apply to be registered.

The register shall contain the names and addresses of all registered teachers in alphabetical order in one column, together with the date of their registration, and such further statement as regards their attainments, training, and experience as the Council may from time to time determine that it is desirable to set forth.

The clauses in Mr. M'Kenna's second Bill are, *verbatim et idem*, clauses of last year's Bill which the House of Commons and the House of Lords agreed on. The last clauses given here were agreed between Sir William Anson and Mr. Yoxall while last year's Bill was in the House of Lords. It represents a form of words and a plan of registration in which the National Union of Teachers and the Headmasters' Association are understood to concur, and if it becomes law it will vindicate the long and just attack of the N.U.T. on the old register system, while at the same time opening up a prospect of a self-governed *professional* profession. All the clauses in this second Bill, in point of fact, are proper, desirable, and practically non-contentious ; and yet it is very uncertain whether the Bill will become law. It certainly will not if the first Education Bill takes up many days and nights and stirs up much ill-feeling.

* * *

Dr. Macnamara has gone to the Local Government Board, where, as Parliamentary Secretary (an honoured and honourable position for which he has striven with great skill, endless assiduity, and worthy deserts), he will be able to superintend the administration of the Meals for Necessitous School Children Act, which has become law. Mr. Ramsay Macdonald, a Scot, though member for Leicester, has introduced a Bill to extend that Act to Scotland ; a proposal which Sir Henry Craik denounced on the first reading in language which could hardly have been stronger if the Bill had proposed to authorise Scottish School Boards to poison the hungry. And further—let the Scottish teachers who decline to place a member of their own in the House look to it—there is, it appears, to be a Government Scottish Education Bill.

* * *

A deputation from the Executive of the N.U.T. has waited on the Labour members of the House of Commons, and as a consequence Mr. Philip Snowden has notified his intention of raising discussion in the House on the administration of the Board of Education in the matters of higher elementary schools, secondary schools, pupil-teacher centres, and large classes. Already there has been a skirmish on this question, when the attack did very well, and Mr. M'Kenna responded very favourably. Nobody can tell how momentous this step of bringing the Union into formal and yet close touch with the Labour party may be to Labour and to the Union, but it certainly bodes ill for the peace of mind of people at the Board of Education.

And thus the House wags on.

GENERAL NOTES.

REVIEWING the year's work of the Board of Agriculture, whose functions overlap in a Gilbertian manner those of our Board of Education, the *Tribune* says : "Administrative work is not so widely known as legislative, but it would be difficult to exaggerate the importance of the departmental work done by the Board of Agriculture and Fisheries. At comparatively small cost the Board has developed throughout England and Wales a system of secondary agricultural education at least as efficient as that in any other country. England was somewhat late in adopting systematic education in agriculture, but having taken it up, she has pursued it whole-heartedly. In the last year reported upon there were some thirty-four thousand students at the agri-

A Good Record.

cultural schools aided by the Board. The grant from the Department amounted to £11,000, and, in addition, £84,000 of the 'whisky money' was spent on agricultural education."

OUR esteemed contributor Mr. J. F. Unstead, who is Hon. Correspondence Secretary of the Geographical Association, asks us to draw the attention of our readers to the annual report of that useful body. From this leaflet we learn that the membership of the Association is now five hundred and thirty-five, and includes teachers of every grade, as well as inspectors and unofficial educationists. From the report, which can be obtained from Mr. Unstead at Goldsmith's College, New Cross, S.E., we gather the following interesting items:—1. A memorandum on the ideal atlas for school use will soon be issued. 2. Members can borrow lantern slides at very low rates; a catalogue of slides available is to be issued. 3. The Association answers letters from members about books, maps, apparatus, methods, etc. The subscription is five shillings per annum. All up-to-date teachers ought to be members of this Association.

A Useful Body.

FURTHER, a special Committee of the above Association has been appointed to co-operate with a Committee of the recently-formed Historical Association. This joint-Committee will discuss syllabuses in the combined subjects of history and geography, and will draw up suggestions for a historical atlas for schools. The Historical Association, by the way, held its annual meeting in February, and listened to an address from Mr. Bryce, which has been reported more or less intelligently in the daily papers. At a resumed sitting members settled down to business, and opinions, varied and picturesque, found vigorous expression. Professor Tait said that the period should come at the end and not at the beginning of a school course. He would "stimulate young children by stories over the whole range of history, from '*Non Angli sed Angeli*' to Victoria receiving visitors who told her she was Queen." This is excellent, but by no means fresh. Indeed, in many schools with which we are acquainted the history stories for the little ones deal—and quite rightly too—not only with English, but with general history. Once again the schools lead, but the work is done quietly.

History and Geography.

THIS widening of the history syllabus has been going on for some time in the schools, as the writer knows from personal experience of a wide area. But the Historical Association will doubtless help to spread the catholic ideal. Professor Harte of Exeter thought that English children really knew a great deal more about the devil than about Charles the Fifth. Doubtless the professor was drawing upon personal reminiscence, but his startling assertion will at least arrest attention. It savours, however, of Rip van Winkle to say that text-books on foreign history are few and far between, for there has been considerable publishing activity in this direction for the past six years, as our bookshelf clearly indicates. Professor Tait, in summing up, offered a valuable hint to all intending examiners, which they will doubtless act upon. He said examiners who were also authors of text-books were so "mortally sick" of having their own stuff served up to them that they gave almost exaggerated credit to dissent. Here, indeed, is the bright student's opportunity. We used to dissent ourselves—in days now, alas! long gone by—but we fear it was on matters of fact.

General History.

YET another educational conference! There is, however, some originality about its conception. In connection with the Conference of Colonial Premiers to be held this year, "it occurred to the Council of the League of the Empire," says Mr. Hubert Reade, in the *Empire Review*, "to invite the various superintendents of education throughout the empire, and other high educational authorities, to meet and discuss not only the means for bringing the children of the empire into touch through the school, but also for improving the methods of teaching. It is, however, not yet settled whether the Conference is to be attended by representatives of the colonial universities and technical schools, and so it is uncertain whether anything will be placed upon the agenda with reference to the establishment of a more intimate personal connection between the secondary and higher education of the empire. Why, indeed, should it not be as easy for a qualified Englishman to pass from Oxford to M'Gill or from Cheltenham to the Transvaal Institute as it is for the Prussian who has matriculated at Berlin to visit Munich, Basel, or Vienna without any further examination?"

Another Conference.

WE hope to devote considerable space in next month's issue to details of the arrangements which are being made for the summer holiday courses in French and German at various places on the Continent. These are, as usual, many and varied. Meanwhile teachers who wish for particulars of the twenty-five courses arranged by the Board of Education should apply to the Education Library, St. Stephen's House, Cannon Row, London, S.W., for printed list, which furnishes full particulars. A sufferer at one of last year's courses asks us if the officials guarantee the drains. This we really do not know.

Holiday Courses.

FROM the first of a course of lectures on Japanese education, to be delivered at London University by Baron Kikuchi, we cull the following interesting item. In Japanese schools it is usual to begin the proceedings with the reading of the Imperial Rescript on Education issued in 1890. When the reading is over all bow in profound reverence. This is not the same as reading a copy of our Education Bill of 1870. Here is the Rescript:—

From Farthest East.

"Know ye, Our subjects:

"Our Imperial Ancestors have founded Our Empire on a basis broad and everlasting, and have deeply and firmly implanted virtue; Our subjects, ever united in loyalty and filial piety, have from generation to generation illustrated the beauty thereof. This is the glory of the fundamental character of Our Empire, and herein also lies the source of Our education. Ye, Our subjects, be filial to your parents, affectionate to your brothers and sisters; as husbands and wives be harmonious, as friends true; bear yourselves in modesty and moderation; extend your benevolence to all; pursue learning and cultivate arts, and thereby develop intellectual faculties and perfect moral powers; furthermore, ad-

vance public good and promote common interests; always respect the Constitution and observe the laws; should emergency arise, offer yourselves courageously to the State; and thus guard and maintain the prosperity of Our Imperial Throne coëval with heaven and earth. So shall ye not only be Our good and faithful subjects, but render illustrious the best traditions of your forefathers.

"The Way here set forth is indeed the teaching bequeathed by Our Imperial Ancestors, to be observed alike by their descendants and the subjects, infallible for all ages and true in all places. It is Our wish to lay it to heart in all reverence, in common with you, Our subjects, that we may all thus attain to the same virtue."

* * *

Ancestor-Worship.

THE reverence of ancestors is the basis of Japanese education. The refrain is, in effect, "Let us now praise famous men and our fathers that begat us." And this worship of ancestors has continued, from the oldest times to the present day, to be the most powerful factor in moulding the national character. The introduction of Western civilisation, with all its lack of wonder, has, strangely enough, had no appreciable effect upon this grave spirit of reverence. To a Japanese the spirits of his ancestors are ever present in all the events of his life. The effect of this training is obvious. If a boy is brought up with the ever-present thought that he will one day be an ancestor whose memory future generations will deeply revere, he will be fired by an incentive to play the game as he knows it. We proceed on somewhat different lines, but there is a more basic similarity between East and West than our poet will allow. We give elsewhere an interesting extract from Japanese mythology, which is full of a poetry of its own. (See page 515.)

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Up-to-Date Geography.

EVERY London boy and girl of suitable age ought to be taken to the South African Exhibition at the Horticultural Hall. Such a visit, carefully managed and intelligently utilised, would provide a geography lesson of the highest possible value. It is one thing to read about Cape wool, and quite another to see a fine specimen of the Angora goat. Verbal descriptions of the ostrich are usually as dry as "the remainder biscuit after a voyage," but a child will be keenly interested in the stuffed specimens to be seen at this finely-arranged and representative show. The wise teacher will tactfully connect the exhibition with the *Punch* cartoon which shows the shade of Paul Kruger regarding with astonishment the figure of General Botha in court dress, and giving expression to the opinion that "these English stagger humanity."

* * *

The Machinery is Ready.

A DEPUTATION of scientists recently approached the Prime Minister on the matter of the establishment of a National Anthropometrical Survey with a central staff, to ensure a uniformity of measurements in all schools. The members of the deputation were introduced by Mr. R. C. Lehmann, who will, we hope, write an anthropometric poem for *Punch*. The machinery was ready, he said, and the motive power only was lacking—namely, a grant of between £4,000 and £5,000. The Prime Minister was deeply impressed and very sympathetic, but told the deputation that first of all they must secure the support of public opinion, and that they must undertake to apply this sort of examination to the children of the rich as well as to the poor. Mr. Lehmann unconsciously used the correct phrase when he said that "the machinery" was ready. We have all suffered from the exact scientist, and are anxious as educators to admire him at a distance. Sir Lauder Brunton, who was one of the deputation, lately expressed the opinion that one of the most potent factors in education was joy. Not many of us go with joy to an anthropometrical survey.

* * *

Bachelors of Commerce.

THE University of Birmingham has established an Advisory Board of business men, including Mr. Neville Chamberlain, to co-operate with the professors of the Faculty of Commerce. There are now some two dozen day students who hope to take the degree of Bachelor of Commerce, and eight students have already obtained the distinction. The existence of the Advisory Board of business men will not only keep the University in close touch with outside requirements, but will facilitate the entry of the commercial graduates into business life. The Professor of Commerce, Mr. W. J. Ashley, thus outlines the plan of work in this faculty: "There are two points which I think should be emphasised. The first is that we aim at combining the general culture and mental training of the older academic ideals with a definite and systematic preparation for business life. I have had a good deal of experience myself as an ordinary college tutor at Oxford, and after that as professor at Toronto, and I am convinced that, from the experience I have already had in Birmingham, the programme of work we have arranged does actually succeed in a large measure in accomplishing the two purposes, culture and utility. And the second point to which I would call attention is the close connection which we are establishing between commercial work proper and the technological departments. We are especially providing for the needs of men who are not going to become technical experts, but are going into businesses in which some technical knowledge is desirable."

N.U.T. NOTES.

Ready for Oxford.

BARELY will these words have been published when over two thousand delegates, accompanied in all probability by half as many friends, will journey towards the most illustrious of British universities. On the occasion of our former visit to Oxford, thirteen years ago, the Public Welcome, Reception of Deputations, and President's Address were all crowded into one session, and it required patience and unwonted courtesy to complete the business without evincing traces of weariness, not to say rudeness. And this despite the fact that the presidential utterance of Mr. Ernest Gray, M.A., easily holds the record for brevity. The proceedings will this year begin on Easter Monday at 10.30 a.m., and one anticipates, with more than ordinary confidence, something worth remembering from the lips of the galaxy of civic and university stars assembled to greet us. Eleven separate organisations are included under the general heading of "Deputations," and it is now thought desirable to append the following significant general instruction to the names: "These are now so numerous that it is necessary to restrict the speeches

to one on behalf of each body, and to a period not exceeding five minutes." The arrangement, inaugurated so happily at Bristol, of devoting an entire and separate session to the President's address, is naturally continued, and a noteworthy pronouncement from Mr. A. R. Pickles, B.A., the brilliant and epigrammatic gentleman from Burnley, will certainly be forthcoming. Tuesday and Wednesday mornings are allotted to "open sessions," when all comers are welcomed to the Conference Hall. Until the commencement of the present century the subjects for discussion were decided by the Executive, and I can call to mind many a sturdy conflict 'twixt floor and platform on the results of the Executive's labours. Then, in 1900, the Agenda was practically arranged automatically, the subjects being chosen by a kind of plebiscite of the local associations, and the motion receiving the highest number of votes being placed first. Educational matters of vital import, however, frequently transpired between Christmas and Easter, with the result that almost annually the business arranged at such cost and labour by the local associations was set aside at the instance of the Executive, and great and frequent was the irritation of the Conference stalwarts at this constant abrogation of their privileges. Lastly, a happy compromise was agreed to at Llandudno, whereby the first subject on both Tuesday and Wednesday mornings is selected by the Executive, and the remainder of the Agenda determined by the local associations. With no Education Bill to worry and disturb us, there is opportunity for *educational* discussion, apart from that eternal nuisance the *politics* of education, and in a city with the traditions of Oxford every one hopes that the tone of the debates will be unusually high.

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The First and Second Subjects.

LITTLE criticism of an adverse character can be directed against the Executive's premier choice of subject—namely, "Large Classes;" for in the Association's plebiscite it ranked second, and is easily *first* in educational importance. The motion dealing with it has been entrusted to the capable hands of Mr. W. B. Steer of Derby, a gentleman who simply electrified the Nottingham Conference of the N.F.A.T. by his masterly methods of exposition, and who is likely to follow Messrs. W. A. Nicholls and Frank Goldstone in securing for the class-teachers the very highest Union honours. Custom in the past has usually allotted the chief Executive resolution to the chairman of the Education Committee for the year, but Mr. Steer's persistent and prolonged advocacy of the subject fairly entitles him to the distinction of "opening the ball." The chief subject for the second day is the Report of the Consultative Committee on Higher Elementary Schools, and Mr. J. H. Yoxall, M.P., will simply revel in its destruction. A small section of the Executive wished to give Conference an opportunity of settling that vexed question the right of the permanent teacher in non-provided schools to "volunteer" to give denominational religious instruction once for all; but they were easily outvoted. My personal view is that "Training of Teachers" should have had the preference to the Higher Elementary Schools Report; but as it is certain to be adequately discussed, no great harm can be done through its non-selection. "Staff of Schools," "Examination of Scholars," "Combined Departments," and "Attendance at School" are other topics with a fair chance of being ventilated.

A. C.

NOTES FROM THE NORTH.

The Scottish Education Bill.

CONFLICTING rumours have reached us of the progress of the Scottish Education Bill. Captain Sinclair, the Secretary for Scotland, announced at the beginning of the present session of Parliament that he proposed to introduce a Bill which would not be of a very comprehensive character. The following points are expected to be dealt with: The medical inspection of schools, the feeding of children, the disposition of the equivalent grants, and the superannuation of teachers. With regard to the medical inspection of schools, it is expected that the Scottish Bill will contain the non-controversial clauses of the recent English Education Bill. The feeding of school children has already, as we show below, had a field day, and the English Act of last year has been so far applied to Scotland; at all events, it has passed its second reading. As the result of recent legislation with regard to England, Scotland is entitled to eleven-hundredths of whatever money is given to England. The Bill for Scotland will regulate the administration of this "equivalent grant." With reference to the superannuation of teachers, it is confidently expected that the power to supplement the existing small pensions will be given to School Boards, and it is just possible that a Government grant may be given for this purpose. Such are the main outlines of the projected Bill; but I have it on very good authority that the drafting of the Bill is in a very backward condition, and that there is little prospect of the Government undertaking any Scottish educational legislation this session. It is a pity, if such be the case, that the Secretary for Scotland should have raised in the breasts of Scottish educationists even these small hopes. I trust Dame Rumour still maintains her uncertain reputation, and that, notwithstanding all these drawbacks, Scotland may yet have the fruition of her long-deferred desires.

* * *

The Feeding of Children.

A SCOTTISH edition of the English Act for the Provision of Meals has passed its second reading by 231 votes to 52. There can be little doubt that in passing this Bill the Government is going strongly in the teeth of Scottish opinion. The majority of School Boards in Scotland have expressed antagonism to the Bill, while the controllers and supporters of free-dinner funds, and other persons who follow the problem of poverty into the home, have also given strong indications of their opposition to the measure. It is true, as some of the advocates of the Bill in the House of Commons said, that the Bill will be permissive, and School Boards will not be compelled to adopt the scheme; nevertheless there is a suspicion that influence will be brought to bear on members of School Boards by those who are always desirous of charity. Scotsmen have always been proud of their independence. The sapping of parental responsibility will inevitably result from the measure. Another effect will, we feel sure, follow—namely, the drying up of the flow of charity and benevolence. It will doubtless begin with the feeding of the necessitous children, but will eventually extend to the feeding of many of the parents, who could well afford to feed their own children if they were less profligate with their means. Nor will the assessment of a halfpenny per pound ultimately cover this cost. School Boards will be forced to erect and equip more buildings and increase the school staffs to supply these meals.

Professor Darroch favours the Feeding of Children.

IN his recently published book—the first of the social problem series—Professor Darroch, Edinburgh University, deals with the various causes that operate for the underfeeding of children. This may first arise through the temporary poverty of the parent, due to his temporary illness or temporary unemployment; in the second place, it may be due to the chronic and permanent poverty of the parent; and in the third place, it may arise through the indifference, the selfishness, or the vice of the parents. After discussing the various methods suggested to meet these cases, he says something must in the meantime be done. The children are there; they will suffer; and their wrongs cry aloud for redress. It is certainly true that any aid given to the child will tend, meanwhile, to keep the wages at bare subsistence rates. It is also true that the distribution of relief only tends to make the poor comfortable in their poverty instead of helping them to rise out of it. But these evils are evils which fall upon the present adult population. Education has, however, to do with the future—with the next generation, and not with this. Its aim is to secure that as large a number as possible of the children of the present generation will grow up to be economically and ethically efficient members of the community. He asks if the present voluntary agencies are doing sufficient to remedy the evil, and if the evil will be lessened in the next generation. His answer is that they are assuredly not doing so, if the experience of the present and of the past are safe guides as to what we may expect in the future. Hence his conclusion is that he has no hesitation in urging that the feeding of children attending the public elementary schools should be organised on lines similar to the recommendation laid down in the special report from the Special Committee on Education (Provision of Meals) Bill, 1906.

* * *

Institute Doings.

I REFERRED last month to the candidates for the Presidentship and Vice-Presidentship of the Institute, and hinted that there was a probability of one or two more entering the field. The third candidate for the Presidentship is Mr. John M'Whan, Cambuslang, who at present holds the position of convener of the Parliamentary and Emergency Committee. For the Vice-Presidentship the second candidate is Mr. George Cameron, Inverness. Dr. Morgan, who was nominated by the Edinburgh Branch, is likely to withdraw from the contest, so that the two candidates for the Presidentship will be Dr. Lowson, Stirling, and Mr. M'Whan, Cambuslang. I hope next month to give a short account of the qualifications of the candidates for the various offices. The election takes place during the month of May.

* * *

Headquarters of the Institute.

THE question of the securing of permanent headquarters for the Institute has advanced a step or two recently. The present headquarters are to be vacated at Whitsunday term, and already the special committee has had under consideration several suitable places. A report has been issued to the General Committee of Management, and it will be considered at an early date. My opinion is that the Institute will not yet go the length of purchase, but for another year will be content with renting a house. It is a pity that it could not settle the question at once, as, both from a financial and a professional point of view, it would be better for the Institute to secure premises of its own. The result of the meeting will be interesting. The "ca' canny" policy of the Institute is, however, proverbial.

* * *

Increase of Membership.

I HAD occasion in last month's notes to refer to the great increase of membership in the Institute during the present year. A circular has been sent out by the special committee with the purpose of helping the movement along, and as a result it is confidently expected that the increase in membership will this season exceed two thousand. With a membership of ten thousand the Institute is bound to have a greater power. Whether that power will be strong enough to move the authorities is perhaps a moot point, but certain it is that the true spirit of union has this year received a great impulse. The diamond jubilee of the Institute will thus be celebrated by an additional increase in membership and a better *esprit de corps*. Several branches have added a considerable number. Glasgow is likely to reach a membership of three thousand, while Edinburgh will also reach four figures. The largest increases are to be found in Glasgow, Edinburgh, and Stirling. Some branches have not responded to the call as was expected. The reasons may be far to seek, but the facts are obvious. And unless there is a united branch, there cannot be much good accomplished.

R. D.

THE SNOWBALL OF PEACE.

THE *Review of Reviews* for March contains a study of the Kaiser of Germany as Emperor of Peace. Mr. Stead declares that in Central Europe the Kaiser is regarded as a kind of John Bright in the Imperial purple, and in the character sketch he discusses whether William the Second is War Lord or Emperor of Peace. The Book of the Month is the gruesome "Indiscreet Letters from Pekin," in which Mr. Putnam Weale describes "The Truth about War." As an antidote, we have "A Plea for a World's Pilgrimage of Peace," in which it is suggested that international personages in every country should unite in an international demonstration in favour of internationalism in the shape of a pilgrimage of peace. The pilgrims, it is proposed, should start from New York, and, "growing like a snowball as they pass onward," visit the chief capitals of Europe with a prayer for peace, arbitration, and a limitation of armaments.

THE PRACTICAL TEACHER

For MAY will contain

1. Full Report of the N.U.T. CONFERENCE AT OXFORD.
2. Reviews of

   Eden Philpott's Novel "THE WHIRLWIND."

   A. C. Benson's "BY STILL WATERS."

   F. G. Kitton's "LIFE OF CHARLES DICKENS."
3. Further "IMPRESSIONS OF AMERICAN EDUCATION." By A. E. Roberts, M.A.

BEGINNINGS OF LITERATURE TEACHING.

BY CATHERINE I. DODD, M.A., PRINCIPAL OF CHERWELL HALL, OXFORD.

RUNNING like a golden thread through history is the long roll of folk-lore, legends, and romance. Uninfluenced by court intrigue, unattacked by the proud conqueror of men, undistinguished amid the passionate beliefs for which men have suffered and died, yet nevertheless rooted deep in the hearts of people and nations, and more potent than the stirring speeches which in their day have made and unmade kings, these folk-stories are still with us—our heritage from the past.

These tales, born in the childhood of the world, are the true food for little children, because the child is, from a psychological point of view, near to the child-like races of the early world, and the same things which appealed to the poetic side of the barbarian appeal to him. For the little child is a sensuous, imaginative, and emotional being, scarcely touched as yet by reason; and deep in his heart, as in the heart of primitive folk, lies a craving for fairy tale and romance—a natural craving which calls for gratification. And yet, in an age which talks of evolution and loves to trace the growth of present institutions to their source—an age which recognises some subtle analogy in the growth of a race and of an individual—there are still teachers—fortunately few—who ask, "What is the good of fairy tales?" and urge that children must be fitted to take their part in the present by an exclusive attention to the present. On the one hand we have the person who looks upon the child as so remote from real life that to hint of bloodshed, war, tyranny, deceit, and the frailties of humanity, as illustrated in fairy tale and classical romance, is to harm his soul; and on the other, the person who is convinced that any touch of the ideal or marvellous is alien to the real which they worship: and so the opposing parties find common ground in condemning the teaching of fairy tales in the lower school. In making a plea for fairy tales, it is well to remark that one does not include all fairy tales whatsoever; for just as folk-songs preserved in some remote locality may represent not the highest but the lowest in music, so a fairy tale must be judged in the light of a higher ideal, and, generally speaking, in school choice should be limited to the classic stories.

Now on what ground would one base a defence of such literature? In the first place, are not the fairy tales and sagas more truly real to the child than much that is dignified as real by the adult? The minute and accurate description of the simple, unassuming life of the heroes and heroines of romance; the speedy and immediate consequences which result from certain actions; the unswerving fidelity to detail; the emotions quickly roused and as quickly over; the obvious award of poetic justice, when the good are always rewarded and the bad as inevitably punished—all is consonant to the child's nature, and herein he finds that which best suits his development. By what right does the adult impose his crudities on the child? and by what proof can one obtain the satisfaction of knowing that electric cars and wireless telegraphy are more real than fairy lore?

Again, do we not all at times feel the need of freeing ourselves from the soul-clogging realism of everyday life? Do we not ofttimes wish that our imagination were less trammelled, and that we could see the ideal behind the real, the poetry behind the prose? Why, therefore, deny the child the nourishment best fitted for such a task? Wherever conscientious attempts have been made to teach intelligently and faithfully the fairy and folk lore of our land there has been a consensus of opinion as to its good results—an interest being awakened in all studies, a brighter intelligence and a deeper insight into the lives of others. The child who has learnt to sympathise with the woes of the "Ugly Duckling" or the trials of Jason will be in a better position to enter into the sorrows—yea, and the joys also—of those around him.

Does not Ruskin assure us that defective imagination rather than wilful sin is the root of all our sins? And psychologists now have drawn imagination from the depths whither it had been relegated, to place it as one of the potent factors of our moral life.

Here, then, we have another reason for the inclusion of literature in the schoolroom: all literature worthy of the name offers a wealth of material admirably adapted for the inculcation of morality, and free from the controversies raging about Biblical teaching. Legends, sagas, and classical romance abound in examples of the fundamental virtues—truth, courage, courtesy, kindness to the weak, and the faith that prefers death to dishonour—and the child cannot fail to be influenced by them. Quintilian was right when he declared that the simple reading of great works, such as national epics, "will contribute more to the unfoldment of students than all the treatises of all the rhetoricians that were ever written."

The stories of Tristram, Galahad, Gawain, Geraint, Lancelot, Siegfried, Brunhilde, and Beowulf form the quarry where Chaucer, Shakespeare, Spenser, Tennyson, and Wagner sought inspiration; and these stories are not mechanically manufactured, but they grow slowly and naturally in the soul of the race. They serve to "shape and direct fear, love, pity, anger essentially aright. Literature and history should teach moral experience by proxy, and should shed the light of other days on present duties, so that we may avoid error and waste, and organise our social relations and institutions aright."

It is unnecessary for the teacher obviously to enforce moral truths; there is a more artistic way, which depends on suggestion, and which none the less does not neglect this side. Again, so much of the formal teaching cannot but be based on authority. A thing is because it is. If we impose our very modern view of life on the child, he takes it on authority; his own mind ceases to be exercised thereon, since he lacks the necessary material with which he would exercise his judgment. Now, in simple literary teaching the situations which arise and the mode of life depicted are such as are comprehensible to the child, and he can pass his judgments—crude, no doubt, but of value—on them, and learn to bring the whole weight of his experience to bear on the thing in hand.

And, lastly, do not librarians and teachers of older children make frequent lament that a love for real literature is almost extinct, and that trashy novels and feeble papers form the staple food of many? Surely the reason is not far to seek. One does not expect the average man to take an intelligent interest in the vagaries of the calculus; why, then, should one expect a love for good literature to arise by the light of nature alone? The schools have woefully neglected all literary

training. The years when a child might have been gaining his literary judgments and collecting his literary material have been spent in other things. Fragments only from great authors, in which the child cannot be interested, form for the most part his sole reading. Can one wonder, then, that on leaving school he seeks relief from boredom in magazines and sensational novels?

How are we to choose the tales, and how are we to treat them when chosen? is the question that teachers often ask.

In a little work which has given me much joy to write I have attempted to indicate the lines which should guide the teacher in selecting the fairy tales to put before young children, and I have ventured to work out the treatment in some detail. I refer to *Nature Studies and Fairy Tales*. In Vol. II. the stories chosen are "Red Riding-Hood," "The Sleeping Beauty," "The Babes in the Wood," "Gold-Mary and Pitch-Mary," "Snow White and Rose Red," and "The Discontented Fir Tree." The stories are told to the children by a skilled teacher, with a wealth of familiar detail and as many allusions to the child's own experiences as possible. The teacher sketches the scenes rapidly on the blackboard as she talks. "Here is the wood"—a few trees are hastily sketched—"Here is the sun shining through the trees," "Here is the long path," and "Here is Red Riding-Hood herself." Then a pause is made to review the portion of the story dealt with, and the children are asked to tell the story so far and to illustrate it. If the classroom be hung with Walter Crane's illustrations of fairy tales, interest will be added, a bright and decorative effect produced, and an appreciation of real artistic work fostered. The series of shilling books illustrated by Walter Crane includes *Red Riding-Hood*, *Jack and the Bean Stalk*, *Puss in Boots*, and *Cinderella*. The writer has taken the books to pieces, had the sheets mounted and framed and hung in the kindergarten room, to the joy of all the children who work and play there.

The topics in the old fairy tales are homely and familiar. Red Riding-Hood carried in her basket a pot of honey, a pat of butter, and some cakes for her sick grandmother. Here is a wealth of suggestion for nature studies and observational lessons. Who has seen honey? Who has tasted it? Then follow delightful lessons on a bee, kinds of bees. The creature is observed, drawn on the blackboard, gigantically magnified. His head, body, legs are considered; his colour, his habits, his visits to the flowers, what he finds there; the hive and its history; and probably a visit to some charming country cottage on a sunlit afternoon, with the smell of stocks and gillyflowers in the air, and a domelike beehive standing in a gay little garden, with the hum of insects filling the drowsy world. And the child draws and paints the bee, and the flowers he visits, and the hive, and the pot of honey, and later he models them in clay as well. The pat of butter will lead to an equally attractive series—the cow, milking-time, the dairy, the churn, and butter-making—culminating in a visit to a farm where these delightful objects and processes may be seen. The cakes, again, lead to a discussion on flour, a corn-field, harvest mice, a windmill, a flail, a baker's oven, and primitive occupations connected with them.

The Homeric tales should succeed the old nursery stories, for in them we get stories rich in incident, relationships, and character, and strictly in accordance with psychologic truth. The motives and incidents in the Greek tales are not beyond the feelings and ideas of the children. The story to put before the little child, says Herbart, "must carry on its face the strongest and clearest stamp of human greatness, and such you will not find near at hand. I know of only one place where such a written story may be found—the classical age of childhood among the Greeks." It would be difficult, almost impossible, to find anything approaching these stories in suggestions of interest in all sorts of aspects of primitive life. "*Achilles's Shield*," as Pater has said, "is an image of ancient life, its pleasures and business." We have no such picture of our own ancestors' early world. Even if we could carefully put together a correct picture from various sources, it would lack the unity of *The Tale of Troy* or *The Wanderings of Ulysses*.

In dealing with *The Tale of Troy* with children equal in age to children in Standards II. and III., the main aims of the teacher would be to depict Greek life, and to bring out the beauty and eternal truth of the story. Six months devoted to the story during the literature hours would confer a priceless possession upon the children.

The story may be schemed out in the following manner:—

1. How the war began.
2. Heroes assemble at Aulis.
3. The Greeks encamped before Troy.
4. Duel between Paris and Menelaus.
5. Triumph of the Greeks.
6. Triumph of the Trojans.
7. Repentance of Achilles.
8. The end of the war.

Each section, properly treated, would require half a dozen lessons. The following fragments of lessons from Section 4 will serve to illustrate the method:—

(*a*) *Paris challenges the Greeks.*—The story is told impressively in the following manner: "Again the Greeks marched out to battle, and beneath their feet rose a great cloud of dust, thick as the mist which the south wind brings over the mountain tops; but Achilles and his men remained by their ships playing games on the seashore. And the Trojans came to meet the Greeks, clamorous as a flock of cranes flying southward from the winter and rain. Paris, with a panther skin flung over his armour, his bow slung over his shoulder, came brandishing two spears and challenging the boldest of the Greeks to combat. When Menelaus heard him, he sprang joyfully down from his chariot and rushed to meet him. Then Paris was terrified, and quickly retreated before him; but Hector rebuked him. 'Surely the Greeks will scorn us,' he said, 'if they think you are our bravest warrior.' And Paris was ashamed, and answered, 'Your rebuke is just. I will fight with Menelaus for fair Helen and her wealth.'"

Then a pause is made for the children's reflections, and the teacher questions to stimulate thought. How did the Greeks march to battle? Where did Achilles stay? Why would he not fight? What games would he play with his men? Throwing heavy quoits, throwing spears, shooting bows and arrows. Let us draw the quoits, the spears, and the bows and arrows.

What are cranes? Why do they fly southward in winter? Let us draw a crane. How was Paris dressed? Describe his armour. What is a panther? Where was Menelaus? Let us draw his chariot. Why was Menelaus glad to meet Paris in battle? Was it a fair way to settle the battle by a duel between these two? Why?

(*b*) *Helen and Priam.*—Helen sat in her hall weaving the battles of the Greeks and the Trojans in purple threads, and the goddess Iris appeared to her in the form of one of Priam's daughters. "Dear sister," she said, "behold a marvel! The war is stayed, for Paris and Menelaus are to fight for you." Then Helen longed for her own home and her husband Menelaus, and wrapping herself in white, she went weeping to the walls of Troy. Upon the wall sat Priam talking with the old men and watching the heroes on the plain, and as the fair Helen came near he said, "What wonder that men should suffer for a woman so divinely fair?"

The questions would lead to various reflections. For example, What was Helen doing? would lead to a discussion on the way the Greek ladies employed their time—spinning, weaving, weighing out wool to the women slaves, cooking, making simple medicines; and a further discussion of the kinds of things cooked, and the cooking utensils, and the kind of picture Helen was weaving, and the use of tapestry.

The question why Priam was not fighting would lead to the discussion of the work allotted to the aged men. They could no longer fight, but they gave good counsel. They were like crickets that sit in the woods and send forth a thin, sweet voice. It has been objected that the interest of the Greek tales is mainly warlike, but the slight sketches given above will show that home life, animals, rural occupations, and early industries are constantly dwelt upon; and here is the advantage of the material. We introduce the children quite naturally to the facts of the world about them. There is no need to seek for topics on "common objects" and processes. Here in this delightful early world all knowledge is concrete and particular; there is no weariness or boredom. Instead of hearing in a dull fashion about a horse in the abstract, weapons, wool, parts of a ship, the child meets these things individualised in Achilles's steeds and shield, Hector's helmet, the armour of Paris, Helen's spinning, and Ulysses' ship. Nor are lessons on animals neglected: cranes, panthers, crickets, grasshoppers, goats, peacocks, eagles, are all congruous, and are necessary to complete the picture of Greek life.

The story of Beowulf may succeed the Homeric stories. The chief value of this story as literary material lies in its ethical material and in the faithfully true representation of the lives of our ancestors. It lacks the unity and relationship so characteristic of the Greek stories, but none the less can it be successfully adapted for children about to enter into the realm of real history and pausing on the boundary line of myth, legend, and reality. The Arthur cycle of stories very fitly follows the story of Beowulf; and the child whose mind is stored with the poetic fancies and great deeds of his ancestors is more truly equipped to meet the perplexities of life than the child whose mind is stored with the miscellaneous facts acquired in school for the purposes of modern examinations.

A CYCLE OF SONG.

Teachers who wish to follow the new methods of English Literature Teaching should write to Messrs. T. Nelson and Sons for the Descriptive Pamphlet of their new series of School Poetry Books, which is entitled

A CYCLE OF SONG.

IMPRESSIONS OF EDUCATION IN AMERICA.

BY ALBERT E. ROBERTS, M.A., LONDON DAY TRAINING COLLEGE.

As one of the five hundred British teachers who are visiting American schools under the auspices of Mr. Alfred Mosely, C.M.G., I have been asked to write two or three articles giving my impressions concerning education in the United States.

The difficulties that must necessarily attend such a visit have been reduced to a minimum by the business-like arrangements that have been made in every town to enable the teachers to achieve most easily the objects of their visit. The steamship companies have charged only £5 for the return voyage from England to America; half-fares are allowed on all the Canadian railways; committees have been everywhere formed for the reception of the visitors; bedroom accommodation, in some cases, has been given free of charge; teachers have been met in every town and taken to suitable lodgings, often let at reduced prices; special guides have been printed and provided gratis; syllabuses of work have been freely distributed—in short, everywhere the arrangements have been so thorough and the welcome so whole-hearted and cordial as to make the visiting teacher feel that nowhere else in the world would he have had such a reception—a fact that in itself reflects the enthusiasm behind education in America. It is to be hoped that the mother country will show the same courtesy and cordiality in receiving the American teachers when they pay us the compliment of visiting our schools.

Without any further prefatory remarks I will try to give some of my chief impressions concerning the schools I have seen in New York, Philadelphia, Baltimore, Washington, Indianapolis, and Chicago. At the outset let me say that, as every state has its own educational system, there is no absolute uniformity throughout the States. There are, however, certain common features underlying all education, and these will form the basis of my remarks. The fact that there are several local systems and no national system has certain obvious disadvantages. There is, it is true, a National Bureau of Education at Washington, where statistics are prepared and reports made by the Commissioner of Education; but no executive power is vested in the hands of the Washington authorities. Unification is perhaps not desirable in a democratic country, but there must be enormous advantages to be gained from centralisation; some standardisation is required where want of uniformity tends to impede progress. Take one instance. A certificate licensing a teacher in one district is void in another. A separate licence is required for each district, and granted in each case only upon examination! On the other hand, in a country where the separate states have different interests, each state has an opportunity of working out its own problem, unhampered by any central authority with a limited knowledge of that state's specific requirements.

Perhaps the most remarkable feature of American education is that all education is free, not only in the elementary school, but also in the high school. There are private schools, but they are relatively so few in number as to play little part in the country's educational history. The high school corresponds to our secondary school, but the course in the high school is restricted to the period between fourteen and eighteen; whereas,

in the English secondary school, the ages range from nine or ten to eighteen or nineteen. If the child successfully passes through the eight grades of the elementary school, entering at six, and thus completing his course at fourteen, he "graduates" into the high school; and the capable boy or girl can continue his education free at the normal school, where he is trained for the teaching profession, or at some college or university, where he can prepare for any vocation in life. The high school is thus a link in the chain leading from the elementary school to the university. There is, in reality, an educational ladder reaching, as Professor Huxley put it, "from the gutter to the university." Neither social condition nor sex is a barrier. And in this connection it is worth noting that there are a far greater number of colleges and universities here than in England. Nearly every large city has its college, each state its university. Of course they are a comparatively small percentage of the scholars who graduate from the grammar—that is, the elementary—school to the high school, and a smaller percentage who reach college. The thirty-two million dollars presented recently by Mr. Rockefeller in the cause of education will, I understand, be freely given to help small colleges and universities needing financial help. The enormous amount of money spent on education in the United States is a revelation to an Englishman. In Philadelphia, to take a concrete instance, the Central High School was recently built at the cost of $3,000,000, $50,000 being expended on a telescope in the school observatory. The cost of the De Witt Clinton School, New York, was $1,250,000. Some of the most recently built schools have, amongst other things, bowling alleys, swimming pools, rooms for fencing and boxing, and elaborate gymnasiums, with balconies running round them, sometimes utilised for running tracks.

The Americans keep their face to the East, though I fancy the passion for overdoing is becoming an epidemic. Their enthusiasm in education is unparalleled in England. It may be we have not much to learn as to methods of teaching, save in the primary grades or in technical subjects: at all events, the spirit behind education is an object lesson in itself. Every one takes a healthy interest in education. Though the majority of men do not reap the advantages that a high-school education opens up for their children, still the aim and hope of every parent that his children may graduate into the high school makes him ready to pay for the upkeep of such schools. In England there is a lukewarm indifference towards education, in direct antithesis to the keen interest that is universally manifested in America.

Now let us visit one of the typical high schools. At fifteen minutes to nine the bells in the several rooms automatically ring. The clocks are synchronised automatically too. The boys and girls, in rhythmic order to a musical accompaniment, assemble in the great theatre-like auditorium that has a seating accommodation for two thousand children. The staff are on the platform or stage, facing the pupils. The latter sit, some of them in the body of the hall, which very much resembles the pit and the stalls of a theatre; others in the balcony, which is not unlike our dress circle. The elaborate decorations and electrically-lit ceilings also remind me of the Lyric or the Gaiety. A hymn is sung; a portion of the Scriptures is read. One of the students comes on the platform and recites some poem before the whole assembly. There is no nervousness, no shyness. This is a daily practice, and an admirable one too. After this the pupils march out, again to a musical accompaniment, to their respective classes. School continues from 9.15 to 12.20, and recommences at 12.50—half an hour for lunch—and ends at 2.30. The quick lunch must be injurious to both teacher and taught; but they both have excellent opportunities of leisure, and are willing to put up with the strain of five and a half hours' work with but half an hour's rest. In the classrooms rich and poor sit together; in some cases a coloured girl sits next to a white girl, a millionaire's daughter next to a trolley-conductor's son. After school there is a basket-ball match between two high schools, in the covered gymnasium. Boys and girls are in the balcony—singing, the one side, pæans of victory as their boys score a goal, the other side a song of encouragement specially learnt in case of impending defeat. After the match all go home in the best of spirits, ready for their two or three hours' preparation.

In a few of the large eastern towns, such as New York, some of the high schools are organised separately for boys and girls; but such are exceptions to the general practice, even in their own states—"survivals from the period of cautious experiment rather than indexes of public opinion." Co-education is general in the smaller towns, both in elementary and in high schools. In fact, co-education affects about ninety-five per cent. of all children in the country—a feature that is closely allied to the democratic ideal of progress. "The children are prepared for life by being allowed to participate in life"—that is, to live under natural conditions. In schools exclusively for boys I found the discipline decidedly loose—the only instances of really weak discipline I met. The reciprocal influence of boy and girl, the natural family conditions, and the minimisation of sexual strain are almost universally accepted as indisputable reasons in favour of co-education.

While the moral training of both sexes is on a very high plane, there seems to be some deficiency in the physical training—of the boy, at least—especially during the elementary school period. He seems, generally speaking, to be lethargic, not healthily energetic, not mischievous enough—in short, he has not those manly qualities which we look for. There are several causes, I think, contributing to this, but we will deal with these later. Suffice it to say at present that it is not due to co-education, but rather, in some considerable degree, to the preponderance of women teachers. Rarely are five or six men to be found in a staff of thirty. In Indianapolis there is scarcely a man teacher in all the elementary schools. The number, unfortunately, is decreasing rather than increasing, as will be seen from the following figures:—In 1870 there were 41 per cent. men teachers in the whole country; in 1890, 34 per cent.; in 1900, 29 per cent; and in 1903, 25 per cent. Now this is a serious defect in the educational system. Despite the enormous sums of money spent on buildings and equipment, the salaries of teachers are not high enough to entice young men into the profession. They seek other vocations which are more lucrative. Even in the wealthiest cities the salaries are inadequate. The principal of a high school may receive £1,000 a year, heads of departments from £500 to £600, ordinary assistants from £220 to £480; but it must be remembered that living is about twice as dear in America as in England, and that even these salaries are exceptional, except in the largest cities. The elementary school teacher gets much less. In Indianapolis a principal gets from about £240

to £300 a year, departmental teachers £130, ordinary teachers £120. Hence the absence of men teachers.*

The system of departmental teachers is universally adopted in the best towns in the highest grades. Teachers take special subjects in the high schools, and often in the seventh and eighth grades—that is, the last two years—of the elementary school course. Where there are several teachers of a subject there is a head of the department. Promotion of teachers is made, as far as possible, by merit and ability. An ordinary assistant, in order to become a head of a department, would (in Philadelphia and New York, for instance) have to pass first a theoretical examination, which would aim at testing his knowledge of his special subject; and, secondly, a practical examination, which would take the following form. The candidate would be required to write a criticism of a lesson given by another teacher in his presence, and then, with a little time for preparation, he would give a lesson himself before a class. This practical and theoretical examination is supplemented by a personal test, which constitutes a third and by no means unimportant factor. A proportion of marks is given for the advancement the candidate has made since he left college—that is, for his paper qualifications—while a certain proportion is also given for his personality. This is usually tested by a personal interview before a board of examiners, the man having to discuss points concerning the lesson he has given, and also concerning the criticism he has made of the other teacher's lesson. Then if he acquits himself satisfactorily, he is on the list of those who are eligible for promotion, drawn up in order of merit. A similar method obtains for promotion of assistants to the post of principal. This system of promotion does not hold good in all cities, but it is an earnest endeavour to solve a difficult problem. At least, there does not seem to be much dissatisfaction.

I said above that the want of virility in the American boy was due in part to the preponderating influence of women teachers. There are other factors. It is a rare thing to find a playground in the open air. Basket-ball seems one of the favourite national winter games, but I have always found it played in the school gymnasium in the same insanitary atmosphere that pervades almost every schoolroom I have been in. The rooms are heated almost to suffocation, schoolrooms as well as trains and hotels. Fresh air is nowhere appreciated. In a railway train the windows are hermetically sealed for the winter. In the schoolroom they are very rarely opened. The child's physique must suffer. The teachers themselves I found, many of them, suffering from colds. Want of healthy exercise, due to lack of proper playgrounds and want of proper ventilation, is one of the contributing causes to the poor physique of the American boy. The effeminating influence of exclusively women teachers for boys is, I believe, recognised by the Americans, and it opens up a problem which they have yet to solve. Women are undoubtedly better fitted than men for the four lower grades—that is, up to the age of ten; but after that an admixture of men and women in the staff is desirable. I noticed that in the few schools organised exclusively for girls the principal was almost invariably a man; one or two of the staff were usually men.

I have said little about the absence of such class distinctions as exist in so marked a degree in England. The children of some of the wealthiest citizens will often be sitting beside the poorest. Even in such a school as the Ethical Culture School, New York, which is a private institution, where some of the pupils pay from fifty to sixty pounds a year, the catalogue remarks that the school is not and will not be permitted to become a class school. The education of the rich apart and of the poor apart is an evil and an injury to both. Children of different nationalities, different races, different religions, and different social ranks meet together and learn to respect one another, both in their work and in their play—a training that must have an inestimably good effect on character. Yet as the nation progresses and education advances, with that advancement class distinctions must inevitably widen. Society becomes stratified. The better class of people often live in distinct districts, and so the better class of children naturally go to the same school. The tendency towards stratification of society is more marked, perhaps, in the large eastern cities than elsewhere. There is an aristocratic section who prefer to send their children to private schools, such as Groton, Massachusetts, a school based on the model of the English public school. The private school, however, is very rare, and rich and poor alike avail themselves of the education that is provided free by the State in the public schools.

(To be continued.)

* Compare this with the money spent on making the school look like the Lyric or the Gaiety. The remedy seems obvious.—Ed.

SOME OXFORD EDUCATORS.

BY W. T. GOODE, M.A., PRINCIPAL OF THE L.C.C. TRAINING COLLEGE, GRAYSTOKE PLACE.

A MUSEUM of memories—that is Oxford. The very stones of the place are saturated with the spirit of the men of past time. And in spite of its busy hum and its active academic life, the imaginative visitor can soon people it with the great and notable of bygone years.

ROGER BACON.

The thought of a conference of teachers in Oxford set our imagination working, and we mentally evoked a vision of a conference of great workers and thinkers of the past, they too devoted to the spread of education. What a symposium that would be! And as they passed

before our imaginative eye we singled out those in whom our own curiosity is keen.

First and foremost, that strange figure of the thirteenth century, "Hodge Bacon," as Butler calls him in *Hudibras*—the gray friar whom popular legend connects always, but wrongly, with Brasenose College.

JOHN COLET.

By tradition a necromancer, astrologer, student of the black art generally, inventor of gunpowder, the burning-glass, and the telescope, to say nothing of the head

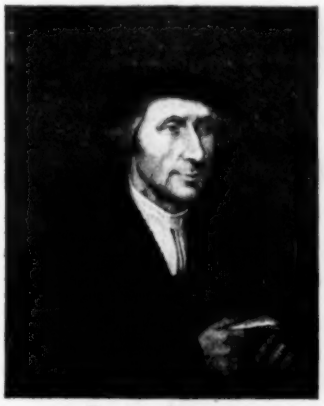
> "Made of brass
> As Friar Bacon's noddle was,"

as *Hudibras* has it, we know now better how to estimate this strange mediæval character. A man of vast learning, far ahead of his times as a student of natural science, for which the "specialle priue places from mennes sight" which he kept in the south of Oxford and at Sunningwell served as laboratories, we know him now as one of the pioneers of scientific research. He despised the scholastic learning of his times, and tried to introduce into Oxford teaching a freer, wider, more liberal strain. But, *doctor mirabilis* as he was, he failed, and suffered for it; and along with him his friend and intimate, the learned, vivid, active Robert Grosseteste, Bishop of Lincoln, linked with Bacon by Butler in his satire,—

> "Yet none a deeper knowledge boasted
> Since old Hodge Bacon and Bob Grosted."

But out of the fifteenth century comes a still more wonderful group of friends—William Grocyn of New College; John Colet of Magdalen College; Thomas Linacre of All Souls; William Lilye of Magdalen; Thomas More; and, last but not least, Erasmus, their pupil, friend, and visitor. A brilliant assemblage these, and a very *focus* of influence! For these were the men who were enamoured of the "new learning," and toiled to spread it at Oxford and elsewhere in England. Grocyn, Colet, Linacre, and Lilye had done the scholar's "grand tour" through France into Italy, drinking deep of the spring of classic studies that had just burst forth there. Lilye had even spent some years in the island of Rhodes, in order to perfect himself in the study of Greek. And though Linacre is best known as a physician and as the founder of the Royal College of Physicians, yet he particularly appeals to us as one of the little group of ardent scholars who set to work to cleanse the universities and schools of the "Latin adulterate which ignorant blind fools brought into this world," and to introduce the study of Greek. Colet did more: he gave a practical shape to their ideas, for to him St. Paul's School owes its existence. Out of his great wealth he built it, and endowed it with money equivalent to nearly £40,000 of modern coin. Its statutes, curriculum, and governance were his loving care. Linacre wrote for it a Latin grammar; Colet himself a compendious accidence, to which Lilye added an English syntax; and Erasmus contributed prayers and a Latin phrase-book. This school was surely blessed in its beginnings when so striking a group of great intellects devoted themselves to its interests. And it is not too much to say that from this group of Oxford men the education given in the grammar schools of "modern" England took its complexion. Lilye was the first high master of the school to carry out the scheme of teaching "good literature, both Latin and Greek." And More, the pure-souled and saintly yet witty and practical More, though he took no active part in the labours of his friends, yet left on record in his *Utopia* the value he placed on education. For him a country should be "a community, one people, well-to-do and educated throughout." He shared Colet's faith in education, and in *Utopia* every child was properly educated. As for Erasmus, his scathing wit and his erudition were placed at the service of real education as much as ever they were at the service of true learning and religion.

From the sixteenth century comes another striking figure, in close attendance on Colet and Lilye. This is no other than Richard Mulcaster of Christ Church, himself high master of St. Paul's School, and before that of the Merchant Taylors' School. In him we detect something of a modern note. Although a famous classical scholar and the head of Dean Colet's School, he was one who could draw up plans for a thoroughly English education—the originator, so to speak, of the Elizabethan "modern side." He could discourse learnedly and practically of the value of games and gymnastics, and urge the education of girls. And, *mirabile dictu*, he declared that those who were going to teach should be trained in their art, suggesting that his *alma mater*



THOMAS LINACRE.

should set aside one of her colleges for the purpose. This strikes the modern note with a vengeance. A shrewd, somewhat hard man was Mulcaster, if his writings do not belie him, but an influential; the friend of royalty, taking part in the festivals at Kenilworth, and dedicating his book to the queen as to an old friend; the schoolmaster of Edmund Spenser, and a

man of great influence in his day. If this influence has not extended far down the years, the fault lies with himself. He deliberately wrapped his thought in hard and

DESIDERIUS ERASMUS. BY ALBERT DÜRER.

obscure language, and later generations forbore to attack so hard a shell when the kernel was, after all, only problematic. But an interesting figure was Richard Mulcaster among educators, if ever there were one.

DR. THOMAS ARNOLD.

In striking contrast to his Cumbrian ruggedness comes John Locke of the same college, Christ Church. The quiet, retiring, somewhat sickly philosopher is a great contrast to the *plagosus Orbilius* we more than half suspect the other Christ Church man to have been. Yet how vastly greater an influence he wielded! Whether from the force of circumstances, the dearth of prominent educational thinkers, or from the Continental influence which his writings have exerted, it is not easy to say, but this seventeenth-century philosopher represents what is perhaps the most striking form of thought in English education between the brilliant sextet of the Renaissance and our own century. His position among English philosophers, and the undoubted influence he has had on the Continent, have helped to deepen the effect which his writings have had on educational thought. And Christ Church has thus sent out two notable educators—one an eye-arresting figure in his own day, the other the spring of an ever-widening stream of influence.

And lastly comes the representative of the later centuries—Thomas Arnold of Corpus Christi and Oriel Colleges. He is still too near to our own day for us to have the clear perspective of his work that we have of the others who preceded him. If anything, he seems to us to stand for a return to the ideal of Colet, as expressed in the statutes of his beloved school—"good literature.....and good Christian life and manners." That is surely no small praise, and would of itself justify our interest. But the man himself, his personality, makes of Thomas Arnold a figure of intense interest among all these figures whom we have imagined as crowding in to the symposium of teachers and leaders among teachers that Oxford has given to England. And on that figure our vision of great teachers fades. To others, no doubt, other names may appeal more strongly. We have conjured for ourselves. Our vision (as all visions will) does but body forth our own interests.

FAR AND NEAR.

INTERESTING ITEMS, CHIEFLY FROM THE PERIODICALS.

An Earthquake in London.

"WHILE earthquakes could not be prevented," said Professor Milne in an interesting address in London, "much could be done to mitigate their effects. In Japan there was a Seismological Society, subsidised by the Government, which had published several volumes on the subject of construction in earthquake countries. If we had an earthquake in London, and the back-and-forth motion was only one foot per second, the probability was that there would be six million chimney-pots in the streets. At Kingston the rate of motion was probably about ten times this quantity. New types of dwelling-houses had been put up in districts where earthquakes were very frequent, and these stood while those of the old type were shattered. Great stress was laid upon the nature of the building materials, the quality of the timber and masonry, and the selection of a proper site. The lightness of the structure was one of the principal elements of safety. In Great Britain the buildings which had been erected at Osborne for naval cadets might be considered earthquake-proof."

The Spanish Santa Claus.

THE current number of the *Girls' Realm* contains, among other attractive articles, a paper on "The Home Life of the Queen of Spain," which is full of human interest. The following extract will give our readers a taste of its quality:—

The little shoes placed on Twelfth Night on the balconies of the windows in Spain by the children, anxious to attract the attention of the procession of the potentates, as they are supposed to pass through the town by starlight, is always a pathetic sight; and parents put the children to bed before the town church bells announce the arrival of the *reyes* (kings), then they place their gifts by the little shoes, even as we put our presents in the stockings of our little ones in the name of Santa Claus.

But the idea of the wise men from the East passing through the streets on Twelfth Night and leaving their gifts where they

THE SISTINE MADONNA.
(*From "Apollo." W. Heinemann.—See page 531.*)

note the little shoes is even a more real article of faith with Spanish children than is the idea of Santa Claus with little English folk; and the letter-boxes in the large toy-shops, marked *Para los Reyes* (For the Kings), are filled every day of the week with missives from children, written with the aid of their elders, begging for particular playthings. These letters are handed subsequently to the parents, who thus gain an insight into the hearts of their children, and the wishes are fulfilled when it is possible.

There is a world of meaning in the last four words. Geography teachers should read the illustrated article on "A German Venice in Midwinter" in this number.

NEWSPAPER poetry does not often arrest our vagrant attention, but we were pulled up a short time ago by a little poem in the *Daily Chronicle*, over the signature C. E. Byles, which seemed to us to have the right ring about it. Here it is:—

In Exile.

INSIDE AN OFFICE WINDOW.

"*For most men in a brazen prison live,*
.....They languidly
Their lives to some unmeaning taskwork give."—MATTHEW ARNOLD.

While here I toil, at some "unmeaning task,"
Within my "brazen prison,"
I know that on the tors the day is risen,
The moors in sunshine bask.

I know that underneath the summer blue
The dewy woods are waking;
I know that far away the waves are breaking
On shores my childhood knew.

And this I know, the swift years pass away,
Their dreams and their romances;
For like a ruthless army time advances
Toward the final day.

And, like a river, life flows where it will,
By meadow or through city;
But not for all regret or grief or pity
The stream *ascends* the hill.

WE have plucked the following plum from *Recollections of a Humorist*, by Mr. A. W. à Beckett. (Pitmans.) The author and Mr. Clement Scott once acted as supers in a certain dramatic piece, and were instructed to play ecarté in dumb show, but in such a way that they might appear to be taking interest in what they were doing. But we shall allow the author to tell his own tale.

A Good Story.

We bowed gravely. We played, and I lost. I emptied the contents of my purse on the table. We played, and I again lost. Then went my watch and rings and my necktie. But now the demon of gambling had seized me. I took off my coat and lost that. Then I sacrificed my waistcoat. Then I lost my boots. Then I allowed my face to rest upon my hands, and wept bitterly, while Clement Scott bent over me and tried to console me. The end of the act was reached, and the curtain fell amid loud applause and roars of laughter. The author was furious.....and no doubt, if he still be living, bears us to this day some ill-will. Some people are so unreasonable.

THE March number of the *Journal of Education* contains a comedy in two acts, entitled "The Master of Method," which is good reading for the jaded educationist. It contains a comprehensive but refined form of objurgation which, with the alteration of a few names, our male readers may occasionally find useful. The names mentioned are those of irate parents—a cab proprietor, an American canner, and a greengroceress. The speaker is a form master in an English secondary school.

On being Comprehensive.

Mr. Jones. May the plague of the house of Pelops alight on Mr. O'Garage! May he be tinned, sold, and eaten by Mr. Josiah P. Wilton and Mrs. Spinach without the garnish of parsley or other wholesome herbs; and may all the fathers and mothers, papas and mammas, with their offspring unto the third and fourth generations; may all the professors of pedagogy, with their offspring also, their lectures, and their books; may all Ministers of Education, their secretaries, directors, and inspectors, with their offspring likewise, their codes, reports, circulars, and memoranda; may all headmasters and governors of schools, *all editors of educational journals and their contributors* —be consigned to the eternal oblivion of Josiah P. Wilton's tin cans and the nothingness of Mrs. Spinach's small potatoes!

The italics are a sign of our magnanimity. We often wish for swift and painless annihilation.

AFTER this we are not surprised to find the *School World* also unbending from the decorum which is supposed to be educational. A certain weary reviewer receives a parcel of English books, and in a mad effort after originality—the *summum bonum* of the age—throws his criticisms into the form of a fantasy which would have delighted a well-known quadruped in *Alice in Wonderland*. (It must be remembered that this is the March number.) The books are puppets which the publishers gently obtrude upon the stage. The machinery creaks a little; but here is a sample of the new method:—

A Reviewer's Nightmare.

The stage was for a moment empty, but some quite unfamiliar faces came peeping from the wings and sliding from the flies. I rose to drive them off, when one of their number told me they were minor poets, and that Mr. Churton Collins was keeping them in order. At this I withdrew, for I knew that if any one could deal with a minor poet, it was Mr. Collins. Mr. Edward Arnold had printed the crew in a cheap edition. I could not catch all of the Greek motto declaimed by the compiler; and when I looked it up in the Anthologia, I found Mr. Collins or Mr. Arnold had made a mistake in the Greek (I like finding out Mr. Collins in a mistake in Greek—he has such an eagle eye for other people's). A list of errata was read out before the show began, but the erratum in the Greek slipped by unnoticed. The

preface, which spoke for xxii pages, defended the minor poets ably; but I must say I was more interested in those who preceded the sixteenth century than in those who followed. The price of the lot was 3s. 6d. Poor minor poets! Some very beautiful figures, hitherto quite unknown to me, walked, with new pride, in the throng. Mr. Collins had summoned them from sleep.

The reader will not be surprised to learn that the title of the whole article is "En Hoexkens ende Boexkens," and that the editors of the *School World* gravely assure us that their reviewer *was* awake when he wrote the paper.

WE strongly advise each of our lady readers to purchase a parcel of the penny pamphlet lately issued by Messrs. Horace Marshall and Son, under the title "How to Manage a Home," and to distribute the booklets at discretion. The reader may be somewhat annoyed at such personal questions as, "Is yours an Oxo home?" but the little book is packed with wisdom and not a little unconscious humour.

The Much-Managed Home.

If the home is not well managed in these days, it is not the fault of the publishers. We have already made reference to the sixpenny monthly *Good Housekeeping*, which contains a useful column entitled "Discoveries." From this column we make two extracts which come home to all our businesses and bosoms:—

In the Family Circle.—Before I had had much experience with housekeeping I realised that half of my work was *picking up* after others. So when a hat was left on the library table, I carried it carefully to the attic. Soon there would be a cry, "Where's my hat?" To which I replied, as calmly as possible, that, thinking the attic quite as appropriate a place as the table, I had put it there. Collars and neckties hung over the back of chairs for convenience were carried to any out-of-the-way place I could think of. The family finally realised that it was easier to put things in their right places.

A Good Suggestion.—When taking a railway journey with a small boy, it is a good plan to slip a tape measure into one's travelling-bag. When he begins to be restless, the boy can be kept busy measuring doors, windows, panels, and seats. Twenty minutes or half an hour passes so peacefully that one hardly realises it.

EVEN the *Classical Review* is waking up. It is now going to become human, and "try to meet the wants of those who regard classical studies from a practical standpoint. Educational questions will therefore be dealt with—the place of classics in national education, whether at school or university; the methods of instruction; the justification of classical work as compared with subjects which are more directed to the earning of money. The *Review* will also include articles which bear on general culture—the light which the past may throw on the present; the relations of the ancient world to the modern, in history, literature, and science, natural or philosophical." Of course, the truth of the matter is that classical studies are on their trial, and that even classical teachers are beginning to recognise that their point of view and their methods must be altered as a mere measure of self-preservation, to put the matter at its lowest. Both Latin and Greek might be taught in such a way that the acquisition of even a moderate amount of each would be of very high value. It is quite possible to teach Latin in such a manner that, without any sacrifice of its great disciplinary value, it is not only brought into close and interesting connection with the school work in French, English language and literature, home and foreign history, but is made to help in a material manner in the understanding and enjoyment of many famous pictures, a great deal of the best English literature which will be read in later life, and the numerous classical allusions which have become part of the ordinary language of the educated man.

A Resurrection.

TRUE to its avowed purpose, the *Review* publishes a stirring article on "Greek in the Public School," by U. von Wilamowitz-Möllendorff, which contains, among many other good things, the following pronouncement:—

A Revolutionary Article.

To be versed in pure Attic, in the classical as it used to be understood, may be necessary for the scholar, but has nothing to do with the schoolboy. For us, the Gospels are classic, full as they are of blunders for the classicist. The old world-wide culture had for its medium this world-wide language, and those who spoke it must have found the same difficulties in Thucydides and Sophocles as an Englishman finds in Chaucer. Attic is not to be neglected, but it is to be treated as a part of the whole.

Appended to the article is a detailed scheme for a new Greek reader, in which the suggested passages are drawn from a very wide range indeed. Those of our readers interested in the matter ought to study the whole article with care. They will also enjoy the paper by R. E. Macnaghten on "Character and Language of the Athenians," to which we hope to refer more fully next month.

"THE Venus of Milo is neither elegant nor dreamy, nor nervous, nor impassioned; she is strong and serene. Her beauty is all noble simplicity and calm dignity like that of the Parthenon and its sculptures. Is not this the reason the statue has become, and has remained, so popular in spite of the mystery of the much-discussed attitude?

The Venus of Milo.

VENUS OF MILO.
(*From "Apollo." W. Heinemann.*)

Agitated and feverish generations see in it the highest expression of the quality they most lack—that serenity which is not apathy, but the equanimity of mental and bodily health."—*S. Reinach in "Apollo."* (See page 531.)

THEY lie overseas, faint and far away, beyond the gates of the sunset. There are but three islands, and each of them fair beyond imagining.

The Fortunate Isles.

The first is Atlantis, the white lost island that men loved long ago; there it is always moonlight. Silver light shines over the sea, and deep blue shadows lie upon the vales. The women of Atlantis have the faces seen in dreams: their hair is blown about them cloudy and dark, and their eyes hold all the deepness of the night. A place of

wan lost dreams is Atlantis, of sad things half forgotten, wholly fair; for many it is heart's desire.

The second island is Ogygia, where Calypso lives yet, looking upon her immortal beauty in the unclouded pools. Ogygia is the sunset island, full of fruits, where dwell radiant women, with passionate eyes, and hair like wine. Dryads sleep in the thickets, and the lusty laugh of the goat-footed piper shrills over the sunset water.

The third is the island of Avalon, all hushed in a clear noon of silence. No ship may furl her sail in the dreaming harbour; for somewhere in the gray and golden fastness upon the heights Arthur the king lies sleeping, waiting until the weary earth hath need of him. All through the isle runs the whisper of singing—half-hushed voices, sweet and distant—and there is always the faint, murmurous noise of dreaming rivers.

Many pass by the Fortunate Isles in the night, sailing they know not whither; and many shall seek them a lifetime long and find them not at all. For the way to them lies through the garden of Sleep, where no flowers grow save the scarlet poppies of Proserpina; and the keeper of that garden no man shall see but once.—*Ethel Talbot in the "Saturday Westminster Gazette."*

THE March number of the *Wide World Magazine* contains a new feature, which will commend itself to all teachers, especially those who take geography, as well as the general reader.

Round the World for Sixpence.

This is the commencement of a series of chatty articles, illustrated with over one hundred photographs, of tours round and about the world. The first of these trips lies across the Dominion of Canada, from the Atlantic to the Pacific, and the pictures illustrate the principal cities, rolling prairies, the majestic glories of the Rockies, and other splendours of the land which we must not call "Our Lady of the Snows." Similar "tours" which will appear in subsequent numbers of the *Wide World Magazine* promise to be equally interesting.

THE following paragraph is taken from the *Times* report of Baron Kikuchi's address at London University, to which the writer of our "General Notes" has already referred :—

Japanese Mythology.

According to Japanese traditions, the goddess Ama-Terasu-O-Mi-Kami (literally, Heaven-shining-Great-Deity, or Great Goddess of Celestial Light), who reigned in the Taka-ma-ga-Hara (literally, Plain of High-Heaven), sent down her grandson (Ni-ni-gi-no-Mikoto) to rule over the Land-of-Luxuriant-Rice-Ears—that is, Japan—with these words: "This is the land of which my descendants shall be the lords. Do thou proceed thither, and govern the land. Go! The prosperity of thy dynasty shall be coeval with Heaven and Earth." These last words were quoted in the rescript; they were words ever present to the mind of a Japanese, and continually occurring in literature. She also gave him a jewel, a sword, and a mirror, which formed the three divine treasures of the Empire. Of the mirror, in particular, she said: "Regard this mirror exactly as if it were my spirit, and reverence (or worship) it as if reverencing me." This mirror was now enshrined in the Temple at Ise, whereunto tens of thousands of pilgrims flocked every year from every part of the country, and to which on every occasion of great national importance the Emperor either went himself or sent a special messenger to announce the event. In the Imperial Palace in Tokio, also, there was a shrine called the Kashikodokoro, or The Sanctuary, where was deposited a facsimile of the Sacred Mirror made in the reign of the Emperor Sujim, 92 B.C., when the original mirror was first moved into a separate shrine, lest its sanctity should be diminished by its being kept in the same building as the living. Here on festival days the Emperor and the Empress, the imperial family, and high officials did worship to the spirit of the first of the imperial ancestors.

THE statement that a naval lieutenant is successfully experimenting on the transmission of musical sound without wires," says the *Daily Graphic*, "follows closely upon Dr. De Forest's attempts at perfecting such a system in New York. Wireless music, it may be presumed, will shortly be added to the marvels of the age. The results may occasion startling changes, and economy in musical entertainment must certainly be one outcome. Why have a band on each cruiser of a squadron when one set of musicians can supply a fleet? Why pay heavy salaries to a comedian to sing in several syndicate music halls when he can shout at one and be applauded in six? These are problems that are certain to confront organisers of every class of music when once the wireless scheme is perfected. Martial-minded persons, again, living within striking distance of a military band, will presumably be able to set up a receiver on the house-top, and so to give most fascinating little garden parties. Undoubtedly this is an invention much to be desired. Probably there are persons experimenting on similar lines whose attempts will be forestalled by earlier patents. For them a nobler task lies to hand. There is a colossal fortune in store for the man who can invent a negative appliance—an appliance that will drive away the sound waves of the German band and the barrel organ. It might even be adapted neatly to deflect them into an unpleasant neighbour's garden."

Wireless Music.

EN ce qui concerne l'intelligence, les inconvénients de la coéducation sont moindres, et nous accorderons volontiers qu'elle peut avoir d'heureux efforts sur l'instruction. Mais de ce côté aussi les écueils sont pourtant nombreux. La coéducation implique en effet un seul et même programme d'études, identique, pour les deux sexes. Et alors de deux choses l'une; ou bien, on appliquera ce programme dans toute sa rigueur, et dans ce cas on détournera les jeunes filles de leur destination dans la vie et dans le monde; on leur imposera des enseignements dont elles n'ont que faire; on négligera quelques-uns de ceux qui leur conviennent le mieux, et qui leur sont le plus nécessaires. Ou bien, pour tenir compte dans une certaine mesures des caractères propres de leur intelligence et aussi de leur future condition dans la société humaine, on aura des ménagements pour elles; on modifiera le plan d'études, on adoucira ou féminisera les méthodes, et ce sera au tour des garçons de recevoir un enseignement mal adapté à leurs besoins et inférieur à leur vocation. Certes, nous ne pensons pas qu'il arrive souvent dans les écoles américaines qu'on y voie, comme l'a raconté M. Ferdinand Buisson, les garçons coudre et manier l'aiguille, ou bien les filles se rompre les muscles au jeu violent du *foot-ball*. Mais quoiqu'on sache assurément en Amérique faire le départ de certains exercices spéciaux qu'il serait vraiment absurde de prescrire aux deux sexes, il n'en est pas moins vrai que dans son ensemble l'instruction qui leur est donnée est une, uniforme, et qu'elle courbe leur intelligence sous un même niveau inflexible, par égard sans doute pour l'égalité de leurs droits, mais au mépris de la différence de leur nature.

La coéducation des deux Sexes.

Just Published. *168 Pages.* *Price Two Shillings.*

A Graduated French Reader

FOR BEGINNERS.

By ALEC CRAN, M.A. (Edin.), Ph.D., and D. ès Lettres (Brussels).

The Modern World

THE HIGHEST PEAKS OF RUWENZORI.
(By kind permission of the Royal Geographical Society.)

GEOGRAPHY NOTES UP-TO-DATE.

BY E. R. WETHEY, M.A., F.R.G.S.

THE DUKE OF THE ABRUZZI'S EXPLORATION OF RUWENZORI.

HIS Royal Highness Prince Luigi Amadeo di Savoia is a born explorer, and his most recent exploit will certainly not rank as one of his least famous achievements. Eleven years ago he commenced operations with an Indian expedition, and was only turned back by an outbreak of plague from attempting the still unconquered Kangch'nj'nga. By way of counterbalance he tried a different quarter of the globe—Alaska—and was the first to ascend the giant St. Elias. From mountaineering he turned his attention to that bourne of so many great explorers, the North Pole, and signalised the close of the nineteenth century by approaching nearer the forbidden spot than any of his predecessors had done (see *The Practical Teacher*, January 1907, page 332); and now, as a temporary climax to his feats, he has solved the great Ruwenzori mystery at the extreme western end of our Uganda Protectorate.

The mountain, or group of mountains, has attracted the attention of many travellers. As long ago as 1864 it was seen by a European—namely, Sir Samuel Baker—and again in 1876 by Gessi. Neither of the two men actually reached it. This first fell to the honour of Stanley in 1888; and he it was who chose the name of Ruwenzori, "Rainmaker," from amongst the numerous native designations of the range. "A more appropriate one," says the Duke, "could hardly be found, since, on account of the clouds which continually envelop its flanks, the summits remain invisible for months and months, and even during the brief interval which separates the wet and dry seasons are only seen in the early morning hours. In the dry season they are obscured by haze from the observer on the plains" (address to the Royal Geographical Society, London, January 12, 1907).

Stanley was followed by many other men of note—Stuhlmann and Scott-Elliot, Moore and Johnston, Freshfield and Grauer amongst them—and all were more or less put to the greatest inconvenience by persistent rains and fogs. The Duke of the Abruzzi himself was foiled time after time last year, and so was his photographer Sella; nor was it until the last few days of his stay that he had any fine weather at all. Of his predecessors, Stuhlmann was the first to recognise at least four distinct groups or "massifs." * Moore was the first to reach the snowline, at between 14,000 and 15,000 feet.

* This is the best geographical term for any great central knot, or group, or block of mountains, and is now adopted by most English geographers. There is, indeed, no good English equivalent.

Here is the Duke of the Abruzzi's itinerary in brief. The dotted line on the map shows the route followed. Incidentally, the short time occupied by the journey is remarkable, especially when one remembers that, for more than ten years after Stanley's visit, it took three or four months to reach Victoria Nyanza from the sea. The railway now reduces that part of the journey to some thirty-six or forty hours.

Itinerary.

April 16. Left Naples.
May 3. Arrived Mombasa.
„ 6. Arrived Port Florence.
„ 7. Arrived Entebbe (the capital of Uganda).
„ 14. Left Entebbe with caravan more than four hundred strong.
„ 29. Arrived Fort Portal (5,000 feet).
June 1. Left Fort Portal for the mountains.
„ 18. Arrived summit of highest peak, "Margherita" (16,816 feet).

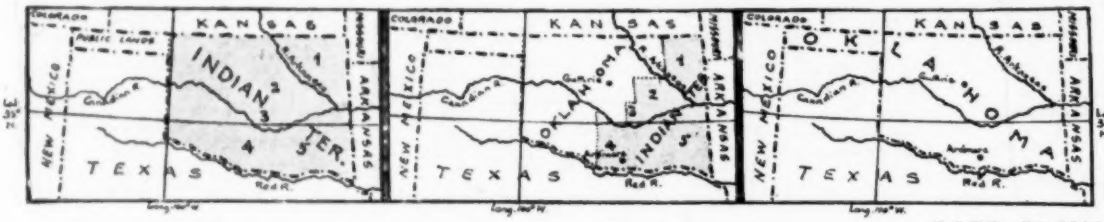
By the middle of September the Duke was once more in Europe. He brought back with him a collection of fauna and flora which has still to be examined, and which should reveal much of interest both new and old to science. Apart from his delineation of the six great massifs and their position, his most important work seems to have been the discovery of the fact that Ruwenzori is not in the least degree of volcanic origin. In the whole upper region he found but one trace, and that local (about 10,000 feet up on the south-east slope), of basaltic veins in the gneiss rock. Incidentally, he was much struck with the smallness of the glaciers. As to the practical uses Ruwenzori may prove to have for Uganda, Mr. Douglas Freshfield, writing in the *Geographical Journal* of March 1907, says: "It will be discovered, I imagine, that it is not in the valleys below the snows, but on the broad upland slopes at the northern end of the chain, that sites for European cultivation and for a sanatorium may be found in the future." Apart from the rain question, this is just what one would expect.

The names attached to the various parts of the Ruwenzori range are interesting (see inset of map). With the exception of one, they were naturally selected by the Duke himself, and, apart from the moot point whether it would not always be better to discover and perpetuate the *native* names of geographical features, are unimpeachable. Captain J. H. Speke is, of course, the discoverer of Victoria Nyanza (July 30, 1858), and the first to associate the great water-basin of Central Africa with the sources of the Nile. Sir Samuel Baker discovered Lake Albert, and, as we have seen, was the first European to sight the mountains now known as Ruwenzori. Romolo Gessi was the first to circumnavigate the lake. He, like his more famous but more unfortunate colleague, Emin Pasha, was one of Gordon's men in the pre-Kitchener days. Both did much exploration work in this part of the Upper Nile. Stanley's discovery of Ruwenzori itself was one of the great events of his Emin Relief Expedition, and his name, as is right, holds literally the highest place on the map. The sixth name, "Luigi (di Savoia)," was selected by the Royal Geographical Society in honour, of course, of the most recent explorer. The Duke had called it "Thomson," after Joseph Thomson, who, though he must have been very near it when on his Tanganyika Expedition, never really saw Ruwenzori at all.

Of the innumerable peaks, four of the highest commemorate the reigning sovereigns of Italy and the United Kingdom—Victor Emmanuel the Third and Edward the Seventh—with their Queens Margherita and Alexandra. The gallantry of the aristocratic mountaineer placed the ladies first, and theirs are the names given to the twin summits of the great mountain. His own account is quite dramatic, and deserves quoting: "It was 11.30; a fresh breeze blew from the south-east; the clouds swept past but a few yards under us, leaving clear only the two peaks—that we had left, and that on which we were standing. And to these summits, the only ones in view at this moment which crowned my efforts, I gave the names of MARGHERITA and ALEXANDRA, in order that, under the auspices of the two royal ladies, the memory of two nations may be handed down to posterity—of Italy, the name of which resounded for the first time on these snows in our shout of victory; and of England, which, in its marvellous colonial expansion, carries civilisation even to the slopes of these remote mountains."

Exit Indian Territory!

Teachers should lose no time in once more "rearranging" the boundary lines of "Indian Territory, U.S.A." In the last fifteen or sixteen years all the atlases have been out of date on this subject as fast as they were published, for Indian Territory was continually "ceding" its lands bit by bit to its pushing neighbour Oklahoma. Now the last cession has been made, and the maps will need no further alteration, for on June 16, 1906, President Roosevelt signed the Bill passed by the United States Congress admitting Oklahoma and Indian Territory into the Union as one state, *with the name of Oklahoma.*



E. H. Wethey, M.A., F.R.G.S.

Before 1889. 1890-1906. 1906 (June 16).

THE PASSING OF "INDIAN TERRITORY, U.S.A."

Scale of English miles. 0 100 200 300

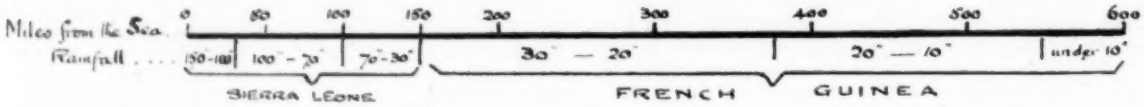
The "5 civilised nations"—1. Cherokees. 2. Creeks. 3. Seminoles. 4. Chickasaws. 5. Choctaws.

The three maps show the process of "absorption." Originally part of the famous Louisiana purchase in 1803, the country was officially allotted to various Indian tribes, notably the "five civilised nations," in 1834. The portion known variously as "Public Lands," "No Man's Land," "Neutral Strip" was reserved for Federal use. From time to time wide areas were ceded to (filched by?) the United States, until the first climax came in 1889–90, when the territory hitherto known as Oklahoma was thrown open to settlers. The "rush" that followed is historic. In one day alone as many as fifty thousand settlers entered and occupied the land, fighting, where necessary, hand to hand for their respective claims. Similar scenes followed in 1893, when the "Public Lands" and a strip of Cherokee territory were added to the new territory. Now the two territories are one, and will form the forty-sixth state of the Union. And this new state should have a future before it. True, it is thinly peopled at present. From a million to a million and a half inhabitants are spread over some seventy thousand square miles, an area considerably larger than that of England and Wales. This is a defect, however, which time will cure. The state has plenty of natural resources—fine, open, rolling prairie lands, growing cotton and flax in the river valleys; splendid lumber grounds and pastoral regions, already exporting produce; mines of coal, wells of petroleum, quarries of granite and limestone. Not much manufacturing, comparatively speaking, is done at present (cotton-seed oil is perhaps the chief of these industries), but that will come. There are already some six thousand miles of railway feeding the country, and these should be largely extended during the next few years. Guthrie is the capital; Ardmore is the chief raw-cotton market.

One wonders how the Indian population will settle down under the new order of things. There are nearly one hundred thousand of them all told, or about one-third of the entire Indian population in the United States. The days of killing them off by guns or fire-water are past; they will fall slower, but none the less surer, victims to the gentler arts of "absorption."

Diminution of Rainfall away from the Sea Coast.

Sir Harry Johnston, in his new book *Liberia* (2 vols. Hutchinson), gives some up-to-date figures relating to the rainfall of that part of the West African coast which borders the north side of the Guinea coast. Converted into the form of a diagram, they make a good object lesson on the general truth of the headline of this paragraph. The rapid drop at the beginning is accounted for by the proximity of the plateau edges to the sea. Directly the plateau itself is reached the diminution of rainfall becomes much more gradual.



CURRENT EVENTS CONNECTED WITH HISTORY.

BY E. M. WILMOT-BUXTON, WISTON'S SCHOOL FOR GIRLS, BRIGHTON;
Author of "Makers of Europe," etc.

The New German Reichstag.

ON February 19 the twelfth session of the German Reichstag opened in the White Hall of the royal palace at Berlin. Since the last Reichstag had been summarily dismissed for defying the Emperor and the Federal Council on the question of the maintenance of troops for the protection of the colonies, the point at issue in the recent elections has been the important one as to whether the nation, as represented by the Reichstag, was strong enough to continue to assert its will against that of the Emperor, or as to whether Imperialism was still to be the order of the day. The result of the elections was a defeat of the "Social Democrats," owing mainly to the strong appeal made by the Government to the fighting instincts of the people.

But although Germany has by this means preserved its historic tradition of submission to the Emperor's will, the spirit of defiance shown by the late Assembly has left its mark.

"In such strength of national feeling," says the Kaiser in his speech from the throne, "uniting citizens, peasants, and workmen, the destinies of the Fatherland are well protected. In the same way as I am resolved conscientiously to respect all constitutional rights and prerogatives, so I entertain confidence that the new Reichstag will recognise as its supreme duty to preserve and strengthen intelligently, and with readiness to act, our position among civilised nations."

So at present the Imperial policy of Germany stands secure.

The Russian Duma and its Significance.

On March 5 the second Duma, the "representative and constitutional" Assembly of the Russian Government, met at St. Petersburg. Only a few of the faces of the first Duma were to be seen, but outwardly all looked calm and picturesque enough, with the peasant deputies in their red and blue blouses, and the priests in their long black robes.

The methods, however, by which these representatives had been elected cannot fail to strike an Englishman with astonished dismay.

It appears that M. Stolypin, the leading Minister of State, for the purposes of the election, invented a system for breaking up opposition to the Government by requiring each political party to register itself, and forthwith refusing registration to the important section of "Constitutional Democrats" altogether. They might not hold meetings, nor might any printer print their manifestoes; hence it is small wonder that the smouldering revolutionary spirit is fast becoming a blaze.

The whole of the elections was held, moreover, under martial law; and thus, under circumstances such as these, one must feel that to say the Duma represents the wishes of the nation is absurd. Yet it is most significant that even under these hampering and indeed paralysing conditions the Opposition party is numerically far stronger than the Government; and in England a minister in the position of M. Stolypin would have to resign.

As a Russian newspaper remarks, "even apart from constitutional grounds it is on the bare ground of ordinary common sense difficult to see how a Government which has labelled all the parties of the Opposition 'sedition-mongers' and 'revolutionaries,' persecuting them with arrests like criminals, can co-operate with them in the work of legislation."

The temper of the new Duma was seen clearly enough when a message was read, on the opening day, from the Czar. The members of the Right (the Government) rose and shouted, "Long live the Czar," but the Centre and Left remained seated and kept an ominous silence. In this manner only, as it appears at present, can the real feeling of the country, now seething with revolt, be shown, unless it be by the bomb-throwing and other outrages, which only seem to increase as the executions and tortures of the Government become more savage.

Such a state of things can only be in the least degree understood when we remember that civilisation can scarcely be said to have touched Russia till the days of Peter the Great, who died in 1725, and that the emancipation of the serfs in that country did not take place till more than a century later. It will take more than two centuries of so-called civilisation to bring Russian methods of government into line with those of Western Europe, and to establish a really constitutional government in a country of unwieldy size and strongly-marked class distinctions—one, too, which is permeated with a spirit of revolution in consequence of the arbitrary rule of the predecessors of the present Czar. But, to judge from the present constitution of the Duma, in spite of the immense pressure put upon the people by the Government, we may safely conclude that the future methods of ruling Russia will not be upon the traditional lines.

The Constitution of the British Army.

The measure for army reform introduced by Mr. Haldane on February 26 contains some very interesting points in connection with the past history of our army. It is proposed that two forces should be maintained, the smaller to be in the field, the larger to be a home force, raised from militia, volunteers, and yeomanry; and from this the field force is to be replenished in time of war or as service expires. For this home force men are to be raised and drafted by county associations—which emphasises the territorial idea, since it lays upon the various districts the responsibility of keeping up their fair proportion of men. This idea of local interest has been introduced during the last thirty years by the substitution of county names, such as that of the "Lancaster Regiment" for the old and more romantic title of the "King's Own." It should certainly tend to foster a general desire to do one's share in protecting the country, instead of the idea that an army can be made up of wastrels or of men who enlist as a last resource when work is not to be had; and it will offer the immense advantage over the volunteer movement, to which we had recourse in the South African War, of providing men who have learnt to ride and march and shoot as soldiers should.

The project is not a new one in English history. When the Civil War broke out in 1642, the London "train-bands" and volunteers were almost the only support upon which the Parliament could rely. The local levies of the counties were untrained, unfit, and practically useless. Cromwell writes thus of them to Hampden: "Your troops are most of them old, decayed serving-men and tapsters, and such kind of fellows; and *their* troops are gentlemen's sons and persons of quality. Do you think that the spirits of such base and mean fellows will ever be able to encounter gentlemen that have honour and courage and resolution in them?" And for this reason he proceeded to found the Eastern Counties Association. Meetings of yeomen and citizens were called in the moot halls, the market houses, and churches. Pamphlets were circulated through the counties, passed on from hand to hand as was the fiery cross itself in wilder lands, and each man contributed according to his means. One provides a "muskett," another a "coslett," a third a month's pay. Some unite to furnish a man and his pay between them. "John Weeles, clark, will find a muskett compleat, but no paie," and "George Curson will contribute 10s. for the paie of Mr. Weeles's muskett." "Up to the creation of the New Model army in 1645 it was practically the one complete and wholly reliable piece of war machinery at the disposal of Parliament." From it Cromwell picked his Ironsides, and of it he said: "I had rather have a plain russet-coated captain that knows what he fights for and loves what he knows than these whom you call gentlemen and nothing else."

It was, by the way, from these "russet coats," served out to the men of the Eastern Counties Association, that the scarlet coat of the regular army in later days took its origin, and the whole idea is founded on the methods

of the ancient Saxon "Wapentake," or the "taking up of weapons" according to the resources of each district of the land.

SCIENTIFIC AND GENERAL NOTES.

BY J. HART-SMITH, A.R., C.SC., F.I.C., BATTERSEA POLYTECHNIC.

Beef Extracts.

BARON LIEBIG first directed attention to the *culinary* qualities of meat extract about the year 1860. These extracts are made by heating, under pressure with a little water, fresh meat that has been chopped up. The extract is filtered and evaporated either *in vacuo* or in the open. Thirty-four pounds of beef will yield about one pound of the extract.

The changes that take place during the heating process can be easily demonstrated in the following manner. Place in a beaker of water some small pieces of meat and stir for a few minutes. Next, slowly heat the beaker over a Bunsen burner, and it will be noticed that at a temperature of about 58° C. the water becomes milky owing to the coagulation of the protein which has dissolved out of the meat. At about 71° C. most of the coagulated protein rises to the surface as a brownish scum, leaving the liquid much clearer. If now the liquid be filtered, the whole of the protein, the most useful part of the meat, will be removed. The only substances remaining in the liquid are the mineral matter and the extractives. These two substances are found in beef extracts, which generally have the following composition:—Water, 20 per cent.; mineral matter, 20 per cent.; extractives, 60 per cent.

The value of meat extracts depends chiefly on the extractives, hence it is necessary to consider these carefully. They bear the same relation to proteins as china clay does to the granite from which it has been derived. They may be regarded as broken-down proteins, and are valueless as tissue-formers. Also, they cannot be oxidised in the body, so are not capable of producing heat. As a food, therefore, they are without value. Liebig himself recognised this, for he states: "Meat extracts cannot make us strong."

These extractives are said to be stimulating, but there is no satisfactory evidence of this. They have, however, a marked effect on the digestive organs, being among the most powerful exciters of gastric secretion that we possess; hence they rouse the appetite and aid digestion.

The Koch Theory of Consumption.

This theory has now, judging from the report of the Commission on Consumption, been completely destroyed. Dr. Koch stated that bovine tuberculosis and human tuberculosis were entirely distinct, and that consumption was not transmissible from cow to man.

The Commission reports—(1) That tuberculosis is the same disease whether in animal or in man; (2) that it is mutually transmissible; and (3) that a very large proportion of human tuberculosis is derived from bovine sources, especially in the case of children.

The chief source of infection is, of course, milk. A temperature of 70° C., the temperature required for pasteurisation, will not destroy the tuberculosis bacteria; and as raw milk is better for children than milk which has been heated, it will be evident that it is better to ensure that the milk should be free from harmful bacteria than to trust to sterilisation. This makes it essential that the milk supply should be placed under the supervision of experts.

Henri Moissan.

It was with regret that the whole scientific world heard of the death of Professor Henri Moissan on February 20. Moissan was born in 1852, and after studying at the Museum of Natural History, was in 1886 appointed Professor of Toxicology and of Mineral Chemistry in 1889. In 1900 he was made Professor of General Chemistry at the Sorbonne, and in 1906 was awarded the Nobel prize. Moissan's discovery of fluorine in 1886 made him famous as a chemist. Davy many years previous had found that hydrofluoric acid would not conduct electricity; and so he was unable to decompose the acid by electrolysis. Moissan found that, by adding potassium fluoride to the anhydrous acid, he could get the electric current to pass through the liquid, which then decomposed into hydrogen and fluorine.

It is, however, as the man who first produced artificial diamonds that the general public are more familiar with him. He was convinced that diamonds were produced under conditions of great pressure and high temperature, and he therefore devised the following method. Iron was melted in a crucible, carbon added, and the molten mass heated to 3,500° or more in the electric furnace. The crucible was then plunged into cold water, with the result that the outside of the iron solidified. Iron behaves like water when it solidifies, the solid having a greater volume than the liquid. Now, as the iron inside solidified, it tended to expand. The casing of solid iron outside, however, prevented this, and thus a very great pressure was produced. On dissolving the mass of iron in acid, small crystals, which proved to be diamonds, were found.

Moissan, in 1891, found that lime and carbon could be fused together in the electric furnace to produce a new compound, calcium carbide. This substance decomposes when brought into contact with water, liberating the gas acetylene. The process is cheap, besides being simple and safe. This method of making acetylene is the only one that is commercially practicable, so that but for Moissan cyclists and motorists might still be obliged to use the comparatively feeble oil light.

Nomenclature of the Proteins.

The following extracts from the recommendations of the Committee of the Chemical and Physiological Societies will be of interest to all teachers engaged in teaching "Hygiene" or "Science of Common Life."

The word *proteid*—which is used in different senses in this country and in Germany—should be abolished.

The word *protein* is recommended as the general term of the whole group of substances under consideration. It is at present so used both in America and in Germany. If used at all, the term "albuminoid" should be regarded as a synonym of "protein."

Albumins.—These are proteins of which egg albumin and serum albumin may be taken as typical examples.

Globulins.—These include such substances as fibrin and myosin.

It appeared desirable to introduce a general term to include proteins coagulable by heat—for example, albumin and myosin; but a term has not yet been suggested.

The term "caseinogen" should be used for the principal protein in milk, and "casein" for its derivative, which is the result of the action of rennet.

Educational Experiment.

GENERAL HISTORY IN THE PRIMARY GRADES.

BY DR. JAMES KNIGHT, ST. JAMES'S PUBLIC SCHOOL, GLASGOW.

IN October 1906 *The Practical Teacher* contained a valuable and suggestive article by Professor Adamson on "The Widening of the History Syllabus." It may be of interest to learn that such a course of general history as was there suggested has been actually in operation, and has now, in fact, entered upon its third session.

The "Supplementary Classes" of the Scottish educational system present an admirable field for such educational experiments, whether of matter or method. The pupils who enter these classes have all received the amount of primary instruction covered by the "standards;" they have all passed a "qualifying" examination attesting their proficiency in these school subjects, especially English composition; they are all bound to remain at school till they are fourteen years of age, but have no intention of remaining any longer; lastly, they are entering these supplementary courses at ages more and more closely approaching twelve, the inferior limit set by the Education Department. Teachers are thus managing to retain these scholars in increasing numbers for at least a year, and in very many cases—an increasing proportion, as the scheme begins to tell—for not far short of two years. As these pupils intend to enter upon practical life on reaching the legal age limit of fourteen, it is evident that the main object of these special courses is to remove them from the mechanical drudgery which is inseparable from early school work, and to endow them with principles which will be of lasting and immediate service in their practical career. Professor Adamson has done well to emphasise the special function which genuine historical teaching discharges of making good citizens, and his outline of lessons in general history is a valuable and elaborate expansion of Scheme C of the "Suggestions" on the teaching of history recently issued by the English Education Department.

The historical equipment of the supplementary pupils is fairly uniform. For the first three years above the infant division they have dealt with Scottish history up to 1603; in the following year they have had an outline of English history up to the same date, and have followed this up by a more detailed survey of British history from 1603 to the present day. In the supplementary course a new and very important element appears—an experiment, almost, rather than a factor—in the form of literature, in which historical novels play an important part. The formal class-books of the standards, with their selections of miscellaneous extracts, give place to continuous readers, books such as *Esmond*, Conan Doyle's *White Company*, Church's *Story of the Odyssey*, *Westward Ho!* *A Tale of Two Cities*, and the like. All of these have actually been used in St. James's during the last three years. The passages chosen for repetition naturally arise out of their historical reading, and even the songs acquired during the course may lend themselves to the same treatment. The geography lessons follow naturally; in fact, in a supplementary course these lessons will be conditioned on the one side by current politics as reflected in the newspapers of the day, and on the other by the course of historical reading and study, correlation and co-ordination being the order of the day, and all the more that there is no formal time-table, with its pigeon-holes for reading, grammar, repetition, history, geography, etc. Three subjects only need appear—English, mathematics, manual instruction, including drill and drawing in all its branches.

With the definite establishment of a two years' course, it has now been possible to formulate and carry out a more definite and logical scheme of general history. The junior classes with us begin the study of European history from the fall of Constantinople in 1453 down to date, thus completing the sketch of modern history of which they already possess the outlines in their British history of the previous year. In the second year we lead up to 1453, thus dealing last with the less familiar periods of the world's life-story. It will be more convenient, however, in this article, to take the scheme in its chronological order.

Some difficulty was experienced in planning out the scheme so as to cover the ground in a session of forty weeks each year, and at the same time observe a due proportion in the treatment of the different stages concerned. A teacher of classical training will naturally give a great deal of time to the stirring episodes in the story of Greece and Rome; one of the romantic school may be tempted to lay undue stress on the Middle Ages, misled by the false glamour cast over these by the Wizard of the North. In such cases it is safe to take a good text-book, such as Myers's *General History*, mentioned by Professor Adamson, and observe roughly the proportion followed there. For ancient history we have taken as our standard Robinson Souttar's *Short History of Ancient Peoples* (Hodder and Stoughton), which carries us from the building of the Pyramids down to the birth of Christ. For the next eight hundred years we have *The Student's Roman Empire* and *The Student's Gibbon* (Murray) to draw upon; while for the remaining mediæval period we have Gibbon again and Bryce's *Holy Roman Empire*. Some of Longmans's Epochs of Modern History are very useful for maps and details, especially Dean Church's *Beginning of the Middle Ages*, Johnson's *Normans in Europe*, and *The Crusades* by Sir C. W. Cox. But by far the best book, to my mind, for planning out such a course is *Makers of Europe*, by Miss Wilmot-Buxton (Methuen and Co., 3s. 6d.), though it has the disadvantage of omitting as extra-European such countries as Ancient Egypt, Chaldea, Assyria, and Phœnicia, all of which are already familiar to Scottish scholars from the important parts they play in the Bible story. As planned out from these courses, the following is a tentative distribution of time over the forty weeks of the normal school session. The lessons may be given thrice a week for half an hour, or twice a week for forty-five minutes.

1. *From the Beginning of History to the Birth of Christ.* Twenty-two weeks. Egypt, 3; Babylonia, 1; Assyria, 1; Medo-Persia, 1½; Hebrews, 2; Phœnicia, 1; Carthage, 1½; Greece, 5; Rome, 6.

   Authorities for this period: Robinson Souttar,

Herodotus, Rawlinson's *Egypt* in "Stories of the Nations," and any good history of Greece and Rome.

2. *The Roman Empire to the Fall of Rome.* Five or six weeks.

The imperial system. Christianity under the Empire. Tiberius. Nero. Vespasian and Titus. Domitian and Trajan. Three weeks.

Rome in Britain. Hadrian. The Antonines. Severus. As this section is already familiar in British history, one week is enough for revision.

Diocletian. Constantine. The Julian reaction. Fall of Rome. Two weeks.

Consult for this period *The Student's Roman Empire* (Murray).

3. *The Middle Ages.* Part I. From 476 to 814 A.D. Two and a half weeks.

Justinian in Constantinople. The Papacy: Innocent—Leo the First—Gregory. Mohammed—Omar, Othman, Ali—Conquest of Africa and Spain. *The Student's Gibbon* (Murray) will be useful throughout all the subdivisions of the Middle Ages.

Part II. From 814 to 1291. Five weeks.

The East—Haroun al Raschid—Saladin. The Crusades. The Holy Roman Empire: Charlemagne—Henry the Third and the Truce of God—Henry the Fourth at Canossa—The Empire and the Papacy. Hansa League—Barbarossa. The Capets in France—St. Louis. Sicilian Vespers—Venice.

In addition to Gibbon, Bryce's *Holy Roman Empire* is indispensable for the principles of this unique organism in politics. The best account I have yet met of the peculiar relations of the Empire and the Papacy, and of the actual conditions of life in the Middle Ages, is that contained in Karl Federn's *Dante and His Time* (Heinemann). "The Story of the Nations" series (Fisher Unwin) contains quite a number of books bearing on this period, and the excellent Encyclopædic Primers of Messrs. Dent are useful. That on Venice is specially good. Putnam's Sons publish also a very full set of "Heroes of the Nations," many of which volumes deal with the Middle Ages.

Part III. From 1291 to 1453. Five weeks.

The Normans in Europe. William Tell and Switzerland. Italian zenith—Florence and Rome—Dante, Michael Angelo. The Hundred Years' War, for revision. Reformation beginnings: Wyclif, Huss, Jerome. The monastic orders: Bernard, Francis, Dominic. Tamerlane in Asia—The Turkish movement—Fall of Constantinople. Voyages of discovery—Invention of printing.

For this period the same authorities may be consulted, though Longmans's "Epochs of Modern History" have several good volumes here, especially the three already mentioned. Among the "Heroes of the Nations" series, Mrs. Oliphant's *Jeanne D'Arc* is specially to be commended. Other volumes bearing on the period are *Saint Louis*, *Wyclif*, *Mahomet*, and *Gregory VII.*

For the course in modern history, from the Fall of Constantinople down to the present day, it is found more convenient to follow the guiding lines laid down in the excellent little book already mentioned, Miss Wilmot-Buxton's *Makers of Europe* (Methuen)—a book which will indeed serve as a guide over most of the ancient and mediæval ground just covered, though demanding the insertion of personal incidents and other "living" episodes from some of the more detailed volumes. The forty weeks of this modern course given, be it remembered, to pupils of the first year, would thus embrace the study of the following broad world movements:—

The Renaissance: Copernicus and Galileo—Savonarola.

Wars of the Reformation: The counter-Reformation—Triumph and fall of Spain—Rise of the Dutch Republic—The Huguenots in France—Henry of Navarre.

The struggle for supremacy in Europe: The Thirty Years' War—France and Richelieu—Le Grand Monarque—The check to Louis the Fourteenth—Rise of Russia: Peter the Great—Rise of Prussia: Frederick the Great—The story of Poland.

The French Revolution: Beginnings of Revolution in France—The Reign of Terror—Napoleon—Fall of the First Empire.

Modern Europe from 1815: The German headship—Franco-German War—United Italy—The Eastern Question, to the Treaty of Berlin, 1878.

The Colonial scramble: Partition of Africa—The Far East: Russia, China, and Japan.

Miss Wilmot-Buxton's book is specially useful as a teacher's guide for a junior class: for it gives at the end of each chapter a useful summary, suitable for record books of either teacher or scholar, serving also as themes and suggestions for composition; and it, moreover, mentions not only the leading authorities for consultation, but also the best historical fiction available.

In such a course as that outlined above the library plays a very important part—not merely the school library of five hundred volumes, now confined to the pupils of the supplementary course, but the district library, which, like all those in the city, has special accommodation for school children, and provides a separate set of books for their use. For the sake of teachers who wish to develop home reading along historical lines, or who are striving to build up a school library, the following books may be recommended:—

A Descriptive Guide to the Best Fiction, by Baker. (Swan Sonnenschein, 1903, with an appendix of historical novels.) *A Descriptive Catalogue of Historical Novels and Tales*, by Courthope Bowen. (Stanford.) (This is rather meagre, giving books and authors only, neither publisher nor price.) *Guide to the Best Historical Novels and Tales*, by Nield. (Putnam's Sons.)

These, however good, smell of the shop, and the living teacher will make up his own list continuously, remembering what Sandy Mackaye says in *Alton Locke*, that "a man kens only what he has learned himsel'." Thanks to cheap reprints, sixpenny editions, and the rest, there never was a time when a five-pound note went further in the way of books, and good books too; and nothing is more simple than to keep a penny notebook, with a page for each half-century or less, and enter in its proper place the useful details of any likely book discovered in that desultory reading which has come to be a kind of intellectual dram-drinking.

BOOKS FOR HISTORY TEACHERS.

TORCH-BEARERS OF HISTORY.

Historical Sketches from World History. By A. H. Stirling, M.A. Two Volumes. Prices 1s. 6d. and 2s.

THOMAS NELSON AND SONS.

AN OUTLINE READING SCHEME FOR THE PRIMARY GRADES.

BY SUSAN CUNNINGTON, BRIGHTON.

IN **Standard I.**, where the mechanical difficulties of reading have not yet been overcome, the introduction to real literature should be made by means of the teacher reading fairy stories, easy poetry, and Bible verses to the children, who by degrees repeat them and *learn certain portions perfectly*. Suitable examples may be found in—

(1.) *Books for the Bairns:* Grimm, Hans Andersen, The Enchanted Doll, Hymns with Pictures, Joseph and his Brethren, etc. (2.) Stevenson's *Child's Garden of Verse*. (3.) George Macdonald's *Child Poetry*.

Standard II.—Still much oral literature, and only a little actually read by the children.

(1.) *Books for the Bairns:* Grimm, Hans Andersen, Aladdin, The Sleeping Beauty, Brer Rabbit, Greek Fairy Tales. (2.) Tales of Romance (based on A. Lang's *Book of Romance*). (3.) Stevenson's *Child's Garden* and E. V. Lucas's *Book of Verse*. (4.) Hawthorne's *Wonder Book*. (5.) Blake's *Songs of Innocence*. (6.) Simple Ballads and Old English Songs.

Our children in the elementary schools suffer real deprivation in never, or rarely, hearing any one thing, however simple, complete and artistically perfect. An exaggerated idea of the value of the "heuristic" method at all times and seasons, and the supposition that the children are "working" if they are continually taking part in broken and disjointed answers or contributions, prevent all possibility of their obtaining any delight in the movement or beauty of a story or poetry. They should be *read to* much more (the schools possess an army of young women as teachers who have in many cases quite exceptional powers of sympathetic interpretation of prose and verse by means of trained reading voices); should *listen* so that they connect form and thought or form and story; *learn* a good deal of what they hear; and *sing* metrical work as much as possible. The dreary function of "reading" should be relegated to voice-production and articulation exercises, and never be allowed to stale or spoil literature.

Standard III.—

(1.) *Books for the Bairns:* Gulliver's Travels, Labours of Hercules, Brer Fox's Adventures, King Arthur and his Knights, etc. (2.) Selections from *Lyra Heroica* or from Arthur Burrell's *English Heroic Verse*. (Dent.) (3.) British Ballads: *John Gilpin, Chevy Chase*, etc. (4.) *Stories from the Odyssey*. (Dent.) (5.) Stories of Robin Hood. (6.) Kingsley's *Water Babies*.

Standard IV.—Here the mechanical difficulties of reading are largely overcome; but only observant teachers are aware of the complete divorce between the matter *read* and the matter *thought*. The boredom incident to large classes, bad readers, checks and interruptions, has led to the formation of a high power of distracting attention in most of the class. The whole process is so tedious that it is not surprising that books are hated.

(1.) Selections from *Marmion* and *Lay of the Last Minstrel*. (2.) Scott's *Songs*. (3.) Legends of Greece and Rome. (4.) Scott's *Ivanhoe, Talisman*, or *Quentin Durward*. (5.) *Britain Long Ago*. Tales from Old English and Celtic Sources. (Harrap.) (6.) Brisk Narrative Poetry: Tennyson's *Revenge* and *Charge of the Light Brigade*, Newbolt's *Admirals All*, Browning's *Pied Piper* and *Good News from Ghent to Aix*, etc.

This standard should still be read to, with their books open before them, and often be set to *read to themselves* in exciting parts.

Standard V.—In this standard the children suffer much from the selection of books provided. Instead of literature with action, colour, movement, they are given Wordsworth's reflective poems upon childhood, Lamb's *Tales from Shakespeare*, Mitford's *Our Village*, and Gray's *Elegy*.

(1.) Scenes from Shakespeare's Plays: *Julius Cæsar, King Henry V., King Richard II., King John*, etc. (2.) Shelley's *Cloud, Arethusa, Skylark*. (3.) Selections from Longfellow's Sagas, *Hiawatha, Evangeline*. (4.) Arthur Stanley's *Patriotic Songs*. (Arnold.) (5.) British Ballads: *Sir Patrick Spens, Robin Hood*, etc. (6.) Kingsley's *The Heroes*.

Standard VI.—For this standard the following are recommended:—

(1.) Coleridge's *Ancient Mariner, Kubla Khan*. (2.) Shakespeare's *Merchant of Venice, As You Like It*. (3.) Macaulay's Essays: *Clive, Warren Hastings, Bunyan*. (4.) Campbell's *Songs and Ballads*. (5.) Thomson's *Tales from the "Fairy Queen."* (6.) Thomson's *Tales from Chaucer*. (7.) Arnold's *Sohrab and Rustum*. (8.) Dr. Garnett's Literature Readers. (Nelson.) (9.) Bunyan's *Pilgrim's Progress*. (10.) Hawthorne's *Tanglewood Tales*.

THE CLASS TEACHING OF GOOD POETRY.

BY AMY BARTER, PUPIL TEACHERS' SCHOOL, BRAINTREE, ESSEX.

IN the "Suggestions for the Consideration of Teachers" issued by the Board of Education, great stress is laid on the importance of the teaching of English as a means of culture. "If we try to create a taste for literature and fail," the Suggestions remind us, "the result is not neutral—a passive state that at some later date may give way to liking. We are sure to leave behind an active distaste. One of the richest sources of encouragement to a life of wide sympathies, of noble ideals, and of courageous endeavour is dried up, and one of the most lasting means of pleasure lost."

The truth of this statement is being realized more and more fully by teachers as they get farther and farther away from the old dark days when "English" meant parsing and analysis, and literature consisted in "getting up," painfully and laboriously, some play or poem selected for examination. When the results obtained under that barren system are compared with the fuller crop which has followed on greater freedom and scope for individual effort, it is almost incredible that any one should feel a single regret for "the good old times."

Yet even now the English lesson has not become to all teachers the source of keen delight it might and should be. Teachers are to be found who, while they acknowledge in general terms the improvement in conditions, yet say that, whereas in the old days they did have some idea of what was to be aimed at and how it might be attained, they now find the whole subject of English teaching so vague and indefinite as to take away interest and paralyse effort. The great difficulty is to find some method in the teaching of literature—and especially in poetry—which, while preserving and revealing the essential spirit of the work to be studied, shall not become vague, superficial, and insincere. How can the teacher best employ the time allotted to the

English lesson? How can he foster a love of good literature, and at the same time provide some more definite work for his class than the mere reading over and over of fine passages? Can the intellectual powers be called in to aid in the attainment of the first aim of literature teaching—the cultivation of the æsthetic faculty?

The problem is a very big and a very difficult one, and it is so fatally easy to do more harm than good in a literature lesson that one hesitates to lay down rules. The ultimate solution must depend on the individuality of each particular teacher. Yet what has been useful to one may be suggestive to another. Every contribution increases the general stock of knowledge, and all opinions contributed to this common stock may enter into fresh combinations there, and prove the germ of fresh growth. It is in this hope that the following account of some experiments in the teaching of lyric poetry is submitted for the consideration of teachers in general. The lessons were given to the preparatory class in a pupil teachers' school. The girls were fourteen or fifteen years of age, but they had had no previous literary training. The work would probably be equally suitable for girls over twelve in an ordinary secondary or elementary school. The books used were *The Hundred Best Poems*, Series I. and II. (6d.), published by Brimley Johnson. Each girl was provided with an exercise book, one end of which she used for notes, the other for answers to questions set. Short, one-idea'd, picturesque poems were chosen as being the most suitable to serve as an introduction to lyric poetry.

Shelley's "To Night."

The poem was first read to the class. The girls then read it through again silently. By a series of questions the various points of the personification were brought out. The children were led to see that Shelley does not think of night as being caused by the sun going down, but by the coming of one person and the disappearance of another. The description of the figure representing night was discussed, and the reason for each part of it given by the children. They were a little puzzled as to why Night should come from an eastern cave, but, after a little thought, suggested and applied the idea of Night following Day round the world. The meeting between Day and Night presented fresh difficulties, until some one suggested that Shelley meant to describe twilight and sunset; then details were quickly added, and the children were ready to grapple with the question as to why Death was called the brother and Sleep the child of Night.

The home-work exercise given was, "Write a description of day and its coming, after the same manner as Shelley's description of night." *

In the next lesson these exercises were discussed. In most cases it was clear that the main idea of the personification had been grasped.

It was next suggested to the girls that Shelley's description should be compared with those given by other poets. No one in the class could remember any lines bearing on the subject, so the following extracts were dictated and written in the notebooks:—

(1.) "The sun that measures heaven all day long
At night doth bate his steeds the ocean waves among."

(2.) "Now 'gan the golden Phœbus for to steepe
His fierie face in billows of the west."

(3.) "At last the golden oriental gate
Of greatest heaven 'gan to open fair,
And Phœbus, fresh as bridegroom to his mate,
Came dancing forth, shaking his dewy hair."

(4.) "But look, the morn, in russet mantle clad,
Walks o'er the dew of yon high eastern hill."

These were discussed and explained. Then the class was asked what point of similarity there was in all five descriptions. The answer, "In each a person is described," led to the introduction of the term "personification." Why does a poet describe by means of personification? The general answer to this question was, "Because it is prettier"—which, of course, contained the germ of the notion. By means of questioning and discussion it was decided that—(1) The poet sees more meaning and beauty in ordinary things than we are able to see; (2) he often thinks in pictures; (3) he is able to tell what he thinks so clearly that other people can see the pictures too.

The children were told to read as a home-work exercise Henley's "A late lark twitters in the quiet skies." A few minutes' questioning at the beginning of the next lesson proved that they appreciated the fact that here were the same poetic qualities, only shown in a rather different way.

Milton's Sonnet on his Blindness.

The class were first told the story of Milton's life, special stress being laid on the facts of his blindness, his strong religious feeling, and his conviction of the sacred and important nature of his work. The sonnet was then read to the class, the children afterwards reading it silently. The meaning of the word "fondly" was explained.

The children were asked to give the main idea of the sonnet in their own words. By means of comparing their accounts with the actual expressions used in the poem, they were led to see that Milton, like Shelley, "thought in pictures." For instance, he thought of the loss of his sight as the going out of a light which had been given him to guide him through the world, before his journey was half accomplished; and so throughout the sonnet. His use of Scriptural images was easily referred to his love and knowledge of the Bible. The way in which the "pictures" added beauty and vividness to the whole idea was noted.

The class was then told that Milton had written another poem, and a much longer one, about blindness—not his own blindness, but that of some one else. They were asked who they thought that some one else was likely to be. The answer, "Some one from the Bible," was soon given, and then almost immediately Samson was suggested. The girls were told to read the story of Samson (Judges xiv.–xvi.) before the next lesson.

The life of Samson was compared with that of Milton, and many points of similarity noticed explaining why Milton should have sympathised so strongly with Samson. Part of the opening speech of "Samson Agonistes" was read to the class, after a brief explanation of the circumstances under which Milton imagines the words to be spoken. The girls wrote in their notebooks the following passage:—

"O dark, dark, dark, amid the blaze of noon,
Irrevocably dark, total eclipse,
Without all hope of day!.....
The sun to me is dark
And silent, as the moon,
When she deserts the night,
Hid in her vacant interlunar cave."

* We should be glad to read a few of these.—Ed.

The class were told to read the Bible narrative (Judges xvi. 21–24) and see if they could find there anything to justify Milton in putting these words into Samson's mouth. The first answer was "No;" but with a little help they soon saw that, though the Bible did not say Samson *did* speak those words, it made it quite clear that he *might* have spoken them: they were quite natural words under the circumstances. On this an attempt was made to demonstrate another poetic quality—imagination working on suggestion. The poet, as was seen in the previous lesson, sees deeply; therefore he is able to understand consequences and results, and to build upon this understanding.

The girls were then asked if, remembering the "Sonnet," they would expect Milton to leave the story of Samson having only told of his unhappiness and misfortunes. They were ready to see that this was unlikely. The concluding speech was read to them, and they wrote the following passage in their notebooks:—

> "All is best, though we oft doubt
> What the unsearchable dispose
> Of Highest Wisdom brings about,
> And ever best found in the close.
> Oft He seems to hide His face,
> But unexpectedly returns."

The home-work exercise given was an attempt to develop the idea of "imagination working upon suggestion" by setting the children to perform the operation themselves. "A little girl lived with her father and mother, and brothers and sisters, in London. They were poor. The little girl fell ill, and was sent into the country to some friends, who were well off and very kind to her. She had everything she wanted, and she loved the country very much. When she got better her friends offered to ask her father and mother to let them adopt her if she was willing. The little girl went out into the fields to think about it. What did she think?"

Mrs. Browning's "A Musical Instrument."

The story of the god Pan was first told to the children, and an attempt made to give them an idea of the way in which the Greeks evolved a nature mythology. The process was compared with poetic personification as seen in the poems studied.

The poem was read, first aloud, then silently. Very little questioning on its subject-matter was required: the poem is so simple and one-idea'd, and the incident it describes appealed to everybody. The "thinking in pictures" and the working of imagination on suggestion were again recognised. The phrase "making a poet out of a man" was discussed, and the children were asked why this should be compared with the making of a musical instrument. The connection between music and poetry was suggested. This led to a discussion on another characteristic of poetry—its melody. The children were asked to illustrate from the poem under consideration. They quickly saw that it had a "tune," and that the tune was different from those of the other poems previously studied. They were asked to put the tune to "la," and after a little trying they did so—*La*-lala, *la*-lala, *la*-la *la*, etc. No technical terms were given, not even "metre;" the children were simply led to see that each poem had a "tune."

They were then asked if they could discover anything else that made the poem musical. Rhyme, the different lengths of the lines, the repetition of the word "river," were noted.

As a home-work exercise they were told to draw in their notebooks the scene as described in verse 2 of the poem, and then as described in verse 6. They were also told to read Tennyson's "Poet's Song" as another illustration of the power of music.

In the course of the preparation of this exercise it was discovered that very few of the girls knew what a dragon-fly was like, and that much searching of books was going on. They therefore drew a dragon-fly in their next drawing lesson; and Kingsley's description of the dragon-fly emerging from the chrysalis, from *Water Babies*, was read to them.

In the next lesson the drawings were criticised and discussed. Robert Browning's "Pied Piper" was then read to the class as another illustration, in a different vein, of the power of music. The "tune" of this poem caught their attention at once, and they were easily led to see that it changed to suit the scenes and actions described. The term "metre" was now introduced. An elementary notion of fitting the sound to the sense was gained by reference to the use made of such words as "rumbling," "grumbling," etc. The comic effect of such rhymes as "rich-in," "kitchen," was noted.

For home work the class was told to write out the story of the "Pied Piper."

Browning's "Home Thoughts from Abroad."

The poem was read, first aloud, then silently, and was copied entire in the notebooks. The main idea of the poem was discussed. The story of Ceres and Persephone—to whom the old Greeks attributed the coming of spring—was told to the children. It was springtime when this poem was taken, and the girls eagerly responded to the suggestion that they should try to see for themselves the signs of spring mentioned by Browning, and also find out and record any others.

The metre was examined, and its variety and delicacy noted as being suitable for the treatment of such a subject as "spring."

For home work the girls were told to look through their poetry books and find out any poems that said anything about spring; also to be ready to quote from any other poem on the subject that they could remember.

The result was very interesting. Browning's "The Year's at the Spring," from *Pippa Passes*, was discussed, and the children were told who Pippa was, and given a little outline of her story. Then came extracts from George Herbert's "Virtue," Shelley's "Ode to the West Wind," Wordsworth's "Ode on Immortality," Shakespeare's "Where the Bee Sucks." The children were told to write in their notebooks the extract which they considered the most beautiful.

The home-work exercise given was an essay on "The Flowers of Spring." It was made clear to the children that this was to be a record of observations made by themselves as suggested in the previous lesson.

Wordsworth's "To Daffodils."

The essays written in connection with the previous lesson were discussed. Then, as an example of a poet's description of a spring flower, Wordsworth's "To Daffodils" was read. The corresponding passage in Dorothy Wordsworth's *Journal* was also read and compared with the poem. The last verse was copied into the notebooks.

The children were then told to shut their eyes and try to visualise the scene described. In most cases it was evident that a vivid mental picture had been formed, and that a sense of keen enjoyment had accompanied the effort.

The class were then asked if they could express in one word the general impression which the poem made upon the mind. The answers "Gladness," "Joy," "Happiness," were given. Can you suggest how the poet makes us feel this? After some discussion the following points were evolved :—

1. By the use of special words—for example, words denoting joyous movement, as "fluttering," "dancing," "twinkle," "tossing," "sparkling."

2. By comparisons—the daffodils are compared with the stars and the waves.

3. By giving an idea of unlimited numbers—"crowd," "host," "never-ending line," "ten thousand."

4. By using a "dancing" metre. This was compared with the metre of other poems, and its regularity and lightly but clearly-marked strong accent noted.

From this discussion the children gained simple ideas of the special power shown by the poet in the choice of words and the way in which he suits these to his purpose. The term "simile" was introduced for the first time, and applied to some of the "picture thoughts" that had been noted in poems previously studied. The idea of the connection between the metre of a poem and its subject was developed. The last verse was examined in detail, and the significance and beauty of the expression, "They flash upon that inward eye which is the bliss of solitude," specially noted.

For home work the girls were told to write a short poem on any natural object they chose, such as a flower, a tree, a bird, or a scene.

These lessons took up the whole of one term, forty minutes each week being devoted to them. At the end of the course it was clear that the following results had been more or less fully obtained with regard to all members of the class :—

1. The children's memories were stored with some of the finest examples of English lyric poetry; and this had been done not by any formal "learning by heart," but by the natural processes of reading, discussion, and repetition.

2. The children's associations with lyric poetry were of an entirely pleasant character. They had enjoyed their lessons, and were eager to read on their own account.

3. They had gained simple ideas of the characteristics of poetry with regard to subject-matter, diction, and form. The training of the æsthetic and emotional faculties had gone on side by side with the training of the intellectual and critical.

4. A beginning had been made in the creation of a literary atmosphere. The idea of the connection between literature and life, though not definitely formulated, had, it was evident, begun to dawn upon the children.

5. The exercises set had encouraged independent effort and originality. In many cases the actual quality of the work done was very poor, but the stimulus it had provided had operated most usefully.

OXFORD CONFERENCE.

Literature Teachers are asked to inspect, at Messrs. Nelson's stall, advance copies of a new, cheap, and highly interesting series, entitled

SHORT STUDIES IN ENGLISH LITERATURE.

EDUCATION IN FOREIGN LANDS.

Japan.—It would be impossible to do justice to the history of the wonderful progress made by Japan during the last thirty years without writing at the same time the story of educational development in the Island Empire of the East. The pioneers of the movement, which has made such a startling change in the relations of the Far East to the outer world, recognised that it was only by a properly organised system of education that the ends they had in view could be attained. The first Education Code of Japan was published in 1872. The imperial rescript accompanying it announced the intention of the Government to be that education should be so diffused that there might not be henceforth an ignorant family, nor a family with an ignorant member. It goes on to say: "Persons who have hitherto applied themselves to study have almost always looked to the Government for their support. This is an erroneous notion, proceeding from long abuse, and every person should henceforth endeavour to acquire knowledge by his own exertions." German ideals and methods have largely swayed the development of education in Japan; but just as Japan has learned to build its own ships and manufacture its own cotton, so it is gradually evolving a system of education suited to the needs and to the characteristics of its own people. In studying the organisation of education in Japan, several salient points confront us. With a view to diminish pressure and competition, no prizes or scholarships are awarded; but, on the other hand, poor students are aided to prosecute their studies by a system of loans. There are no examinations whatever by bodies external to the schools, and less weight, probably, is attached to examinations in Japan than in any other country having an adequate system of education. Set examinations are forbidden in the primary schools, the teacher's daily marks or general impressions determining the promotion of scholars. In the secondary schools examinations, when held, have no influence in determining promotion. Even in the universities the examinations are more often oral than written; and throughout it is the teacher himself who conducts the examination in his own institution. Furthermore, with a view to the thorough assimilation of the work studied, a minimum age is fixed, below which no student is allowed to tread any particular rung of the educational ladder. The kind of record-making which consists in securing some educational distinction or gaining a bagful of certificates at an early age is not encouraged in Japan. So wide is the range of subjects studied in the higher schools, and so lofty the ideal of thoroughness aimed at, that, whereas a student may enter one of the imperial universities at the age of nineteen, the average age of entry is, as a matter of fact, twenty-three. The two imperial universities are maintained by the Government, but there are no grants-in-aid for schools of any other class, as there are with us. The universities, of which there are many private ones in addition to the imperial ones, comprise faculties of medicine, engineering, agriculture, science, economics, law, politics, and literature. Below these are the higher schools, with a three years' course, and an admission age of seventeen. They prepare for the universities, and have three "sides," as we should say in England. These are respectively devoted to law and literature, science, engineering, and agriculture, and, in the third place, medicine. The primary and secondary branches of edu-

cation are interdependent, and form an organic group. Education from the ages of six to ten is compulsory in the lower primary schools with a four years' course. Above these, also with a four years' course, are the higher primary schools, the curriculum in which is much like that of our ordinary elementary schools, with the addition of agriculture, commerce, manual work, and English as optional subjects, out of which one must be taken. A student who has completed at least the second year of the higher primary course may be admitted to the middle schools, which have a five years' course for boys and a four years' course for girls. *Muta'is mutandis*, the curriculum of these schools practically differs from that of our secondary schools only in foreign languages not being obligatory. Chinese classics form a subject of study in the boys' schools. Both in the middle and in the higher schools the moral and physical sciences occupy a more important position in the scheme of instruction than with us, and in all schools physical training is compulsory. A remarkable feature of recent educational development in Japan is the women's university, which has been already referred to in these columns.

Portugal.—Portugal has set itself in earnest to remedy—at least in its higher schools—its educational deficiencies. These schools have suffered from the want of a properly trained teaching staff. Doctors, lawyers, priests, and even those who have made a failure in other careers, have all, without special training or natural aptitude, taken to teaching as a means of support. Moreover, the system of classification by subjects instead of by classes has not worked well, especially as the courses in varying subjects have lasted varying periods of time, and as one subject only has been taken at a time. Each course has ended with an examination, to success in which a certificate has been attached, and under the stimulus of parental encouragement pupils have striven to gain as many certificates as possible. It is on such evils as those referred to that Portugal has turned its back, and the confessions of the failure of the old state of things which the Blue Book contains are of the frankest. "Portugal," it says, "is the classic land of examinations [the China of the West], and *therefore* [we italicise here—ED.] certainly the classic land of ignorance." By a royal decree, dated December 22, 1904, the system of instruction in higher and secondary schools has been assimilated to that prevailing in England and Germany. All subjects of the course are now to be taken simultaneously, the weekly time allotted to each subject varying, as with us, according to the class the pupil has reached. So far we have only touched on the outward character of the reform; but the decree referred to above aimed at making the teaching more formative of intellect and character, encouraging the employment of better methods, providing for a better graduation of the instruction, linking up subjects of instruction, employing intuitive methods as largely as possible, and cultivating the intelligence instead of the memory. Another notable change consists in making German an obligatory subject in the final course, whilst English in this course is only optional. In the lower and intermediate courses German is optional, but no one who has not studied it is allowed to take the final course. The reason given for this—a reason very flattering to our Teutonic friends—is that no one who does not possess a knowledge of German can keep abreast with the present-day developments in the world of intellect. A proof that Portugal is in deadly earnest is that the Superior Council of Public Education invites criticisms of the late reforms, and publishes them in what we might call its Blue Book. Not only so, but the conclusions arrived at by teachers' conferences, as well as the separate opinions of members who dissent from the majority, are referred to a revising committee, which sends its opinions on them to the Superior Council for its approval. The late reforms have been much discussed, and have naturally evoked much opposition. The criticisms of them published in the Blue Book are startling in their frankness. The royal decree is called a "dictatorial pronouncement," the reforms are styled "sheer madness," and the new regulations are held to constitute a "crying injustice." The strong terms used stand in amusing contrast with the expressions of humility which courtesy and usage demand in the commencement of official letters, and to the greeting, "God keep your Excellency," with which in Spain and Portugal such documents end. The favoured position given to the German language is strongly attacked, and it is pointed out that English as a world language is much more useful to the young Portuguese who go into trade, or accept positions in the colonies adjacent to English colonial territory. To this the Government replies that considerations of utility must give way to the higher considerations which dictated the change attacked. Overburdening of teachers and scholars is likewise complained of; but here again the Government stands firm. There is every reason to believe that in the matter of its higher education Portugal has entered on a new era, which will materially modify its position commercially and intellectually.

ESPERANTO MAKING WAY.

IN a report to the Washington Bureau of Manufactures, Mr. H. L. Spahr, the United States Consul at Breslau, says that all over the world trade associations, tourist clubs, scientific societies, and other organisations are seeking a universal language; and whenever an international congress is held, the need for such a language is recognised and discussed. An international committee is being formed, which is to select a universal auxiliary language; and if the committee adopt a language, it is almost certain to be Esperanto. Esperanto is a language with few rules and no exceptions, no irregular verbs; with a pronunciation, accent, and spelling that can be learned in one lesson; and with a small vocabulary, many of whose words learners already know or can guess. Besides, it is clear, flexible, and rather sonorous. There are Esperanto groups in the twenty-four leading cities of Germany, and new ones are forming. Altogether there are about four hundred and twenty-five groups, besides sixty trade or scientific organisations, whose members either are all Esperantists, or use Esperanto when writing to a member in another country. Fourteen periodicals are printed wholly in Esperanto; seventeen partly known and nineteen well-known journals devote more or less space to Esperanto articles. In recent times eight international business or professional congresses have recommended or adopted Esperanto as the language to be used. The language is being taught in many Japanese schools, and Peru publishes an Esperanto journal, while in France and England the movement is especially strong.

The Book Lover.

I.—*THE GIRL GRADUATE—SWEET AND OTHERWISE.*

TAKING into consideration the present uncertain state of Latin pronunciation (see *The Practical Teacher* for next month), we recommend our readers to purchase Messrs. Swan Sonnenschein's new novel, *In Statu Pupillari*, by post. It will never do to risk asking for the book at the public library, unless by the use of the finger alphabet—which, by the way, might with advantage be adopted for the pronunciation of all foreign languages, including Welsh.

We have greatly enjoyed the reading of this story by an anonymous author—or authoress. The heroine is Eva Blumberg—she deserved a prettier surname—and the tale tells of her experiences at Hypatia College in the university town of Atlantis. "Born in a Devonshire parsonage, nurtured among a host of brothers and sisters on such slender fare of all sorts as her parents could afford or conceive of, Eva had lived in sun and shower among her native moors, almost after the pattern of some Wordsworthian maiden. Something of promise, in spite of failure in common tasks, was reported of her by a practical mother to wealthy relatives. The result was that a god-parent offered to send her to Atlantis."

How the simple, awkward rustic maiden was caught in the whirl of the potter's wheel and moulded by love and learning into an educated woman who retained her womanliness, is the theme of the story, which reads to the present writer like a portion from an autobiography, so sincerely and unaffectedly is it set down. Most college stories bore the practised reader, but these girls and boys have been so truly observed and are so faithfully depicted that middle age becomes indulgent of their inexperience and their assumption of knowledge, which are so delightfully fresh and youthful.

There are escapades, of course, for those who like them, including a romantic moonlight adventure on the part of a Hypatian student, Ruth Guest, who had been playing the *jeune premier* at a girls' dance. "To-night glorious moonshine streamed into her room, making it as light as day. The intoxicating beauty brought its own strange promptings; the young blood stirred in her veins. Almost without thinking she had stepped upon the window-ledge, and thence, by a path she had often observed as a possible mode of exit in case of fire, along pipes and other ledges, until she reached the front porch, and so descended to the ground. It was not difficult after that for an unencumbered athletic person to find a point in the weak defences of Hypatia where the walls could be scaled." The story of the rest of the adventure and its sequel are well told, with perfect restraint, and must be read in the volume itself. We do not pretend that this is a great novel—nor would the writer—but it is the work of one who "writes of the little things he (or she) knows about," and who therefore follows the golden rule in literature. It can best be described in the writer's own words, used in connection with the heroine's first literary effort—"a story, crude enough, but yet with a veil of artistry that sufficiently cloaked the original incidents, while its genuine tone betrayed a basis of actual experience." We trust we shall hear of Eva Blumberg again, under a prettier *alias*.

II.—"*A BREEZE 'MID BLOSSOMS STRAYING.*"

WE have received from Messrs. T. C. and E. C. Jack a specimen volume of their "Golden Poets," published at half a crown. It contains selections from the poems of Coleridge, one of the most poetical of our poets, who in his later years described his own verse as "a breeze 'mid blossoms straying." The selection includes all the best work of the poet, and Professor Dowden provides an introduction.

As a rule, we pass by the introduction, and return to it when we have made close acquaintance with the book itself. But Coleridge needs an interpreter, and there could not be a more competent guide than Professor Dowden. He stands aside in the act of introduction, and attains to the height of editorial virtue by means of self-effacement.

When we say that Coleridge needs an interpreter, we do not mean that he is obscure, but that his imagination is so rich and varied that the ordinary reader—even the careful and appreciative reader—misses much of his meaning, both expressed and implied. The poem of "The Ancient Mariner" is well known to nearly all of us; but even the most careful student will find new beauties in it if he reads Professor Dowden's three pages of excellent—the word seems impertinent—commentary on this masterpiece of the poet. The book is worth buying for this passage alone.

We are rightly asked to note carefully the sustained musical quality of Coleridge's verse. It does indeed sing of itself.

> "It ceased, yet still the sails made on
> A pleasant noise till noon—
> A noise as of a hidden brook
> In the leafy month of June,
> That to the sleeping woods all night
> Singeth a quiet tune.
>
> "The shadow of the dome of pleasure
> Floated midway on the waves;
> Where was heard the mingled measure
> From the fountain and the caves.
> It was a miracle of rare device—
> A sunny pleasure dome with caves of ice!
>
> "Such a soft floating witchery of sound
> As twilight elfins make when they at eve
> Voyage on gentle gales from fairyland,
> Where melodies from honey-dropping flowers,
> Footless and wild, like birds of Paradise,
> Nor pause, nor perch, hovering on untamed wing."

Some one has said that Coleridge has left us only enough poetical matter to fill some twenty pages, but that the booklet ought to be bound in pure gold. Of course it all depends upon the dimensions of the page. Possibly the use of a folio size and minion type might allow for the inclusion of the best of the poet's work. At all events, this volume of selections is sufficient for those who do not wish to be disappointed in the study of the poet. They will rarely descend from his best manner if they confine their attention to the pieces here given.

The book is illustrated, and we sought out the artist's work with some trepidation. The frontispiece shows the poet declaiming, with a napkin in his left hand, and two glasses upon a table in the background, containing, presumably, the dregs of the source of his inspiration. We

should not judge the liquid to be the "milk of Paradise," of which the poet speaks in "Kubla Khan." Then we have a number of coloured drawings by Charles Pears. We looked at these in the light of day, and we did not like them greatly. A few hours later we happened to open the volume under a —— incandescent light, and were filled with surprise at the transformation. All crudeness, both of drawing and of colouring, had disappeared. The pictures now expressed the artist's intention, and were in harmony with the text. Did Mr. Pears work by gaslight? We should be interested to know.

Paper, type, and binding of this volume are excellent, and in perfect taste. Moreover, the lover of poetry as the poets wrote it will be glad to learn that the text is that edited by Mr. Dykes Campbell for Messrs. Macmillan. This is a special recommendation of a charming volume in an excellent series.

Messrs. Jack have also sent us F. G. Kitton's *Life of Dickens*, in which all our readers will doubtless be interested. This we hope to review next month.

III.—*LITERATURE AND LIFE.*

THE newer and more enlightened methods of teaching are gradually breaking down the conventional barriers between geography, literature, and history. In fact, these three so-called "subjects" have to some extent become fused into what might fitly be called "the new humanity," seeing that, when treated in the modern manner, they tend to focus the attention upon human nature in its environment, its inspiration, and its past achievement respectively.

We have received from the Cambridge Press a volume which ought to be read, marked, and learned by every teacher of literature and history, not only for its matter, but for its method. It is entitled *National Life and Character in the Mirror of Early English Literature*, and is the work of Dr. Edmund Dale, who says in his preface: "The idea of the book is that, by pricking in, as it were, literary illustrations upon the background of history, a study of the period might gain in interest and definition." The method adopted is to examine minutely all the Anglo-Saxon literature extant, with the object of throwing light upon the daily life, the religious beliefs, the morality, the social, tribal, and national ideals of our Anglo-Saxon forefathers, and to trace in the works of the early writers the building up of the nation which was beaten down under the Conqueror and his sons, only to rise triumphant under Edward the Third.

The method seems an obvious one, but we have for so long been used to regard literature not as a human document, but as a collection of dead leaves, that it is somewhat fresh to many of us. "The true poet," writes Dr. Dale, "is never independent and self-contained in his art, but derives his inspiration from the great movements of his time, paints his pictures from the men and the life he sees about him, and is encouraged and uplifted by the sympathies of those whose hearts leap at his words because he has sounded the depths of their humanity. A literature is but the means by which the aspirations and ideals of a nation find expression in an abiding form." The subject of the book, then, is literature as a mirror of life. The picture drawn by the author is full of detail, and shows early English life in all its aspects in peace and war. Naturally we are specially interested in the children of those early days, and turn with some pleasant expectation to those portions of the work which tell of the little ones and of their parents in relation to them. Dr. Dale writes:—

> On the whole, the parental instinct was strong, and the beauty of the innocence of childhood, and the charm of motherhood fully recognised—
>
> "A pretty child is he
> As sitteth on a woman's knee,
> A dillydown perdee,
> To make a man laugh."
>
> Maternal love forms an essential part of the characters of Chaucer's Griselda and Constance. That of the former is akin to the fatherly love of Abraham for Isaac, capable of regarding the sacrifice of the loved one as the highest test of faith, an ennobling renunciation. Her story was meant to strike a chord of sympathy in every English mother's heart. Desire for the same effect may be seen in the story of the latter, banished from Northumbria, and piteously striving to lull the wailing of the babe in her arms.

Then follows a short description of one of the sweetest child poems in our own or in any language, named "The Pearl," which has been ably edited by Professor Gollancz, and which the student will find paraphrased in vol. iv. of Professor Morley's *Great Writers*. It is here used by

MNEMOSYNE.
(*From "Apollo."
W. Heinemann.*)

THE NIKÉ OF PŒONIUS.
(*From "Apollo."
W. Heinemann.*)

Dr. Dale to prove the strength and refinement of fatherly love in an age when life was less sophisticated than in our time. Possibly the point is somewhat strained. The feeling is elemental, and as old as the human race. Manners and customs may change, but this endures. There is one fact, however, that is worth pointing out and dwelling upon. It is only in Judaic and English literature that the child plays any prominent part.

But the best of children are compounds of angel and something else, and it is interesting to read the opinions of the early writers on that side of child nature of which we as teachers see not a little. "Langland advises parents," writes Dr. Dale, "not to spare the rod lest they spoil the child.....If little Bet will not work, her mother must cut a bough or two. Robert Mannyng says that children must be chastised, but no bones broken. Corporal punishment entered largely into the discipline of the schools: 'With the more sorrow that a thing is got, the more he hath joy to keep the same afterwards, as it fareth by children in school that for learning are beaten when they forget their lesson. Commonly after good disciplining with a stick they keep right well the teaching of their school.'"

A good test of any age is to ascertain the quality of its humour. Even this Dr. Dale does not pass over. The knights of the early times were not above a pun. "When

Lancelot says, 'God forbid that ever we meet, but if it be at a dish of meat,' Guinevere and the Haut Prince cannot sit for laughing." This gives us only a poor

PORTRAIT OF A LADY (HOPPNER).
(*From "Apollo." W. Heinemann.*)

idea of the famous lovers, and perhaps accounts for much in their characters which might have been improved.

The hero of our school days, Richard Cœur de Lion, does not appear to advantage, but we always had our doubts about him. Hearing news which displeased him while eating his Christmas pie, he kicked over the table in an outburst of rage. This was, of course, one degree better than kicking the messengers. But worse is to follow. "Saracen ambassadors come to the king with costly presents to arrange the ransom of certain prisoners. With the greatest show of courtesy he invites them to dine with him, but gives orders to slay the prisoners, and to serve up their heads with names attached as the first course." This story is told by the early chronicler by way of comic interlude. It lets in a flood of light upon the age of chivalry.

But we have said enough to show the quality and manner of Dr. Dale's work. It is charmingly written, and in places the style rises to a very high level indeed. It need scarcely be said that the volume is externally a delight to the student who is also a book lover.

THE LITTLE BLUE BONNET (WHISTLER).
(*From "Apollo." W. Heinemann.*)

IV.—"*ART IS LONG AND TIME IS FLEETING.*"

FOR a considerable time the character of the illustrations supplied in our school books has been undergoing a radical change. The cheapening and improvement of the processes of reproduction have made it possible for publishers to produce books for educational purposes which in themselves cannot fail to have a beneficent influence upon the cultivation of taste. This not only applies to matters of paper, typography, printing, and binding. The old-fashioned woodcuts, which have indeed done the State some service, have been compulsorily retired, and have been replaced, in many cases, by reproductions of works of art, more or less great, the worst of which are better than many of the rough and carelessly-executed sketches "specially drawn for this volume." We can now purchase school books at a low price, illustrated or embellished with the work of the masters of all ages.

This is as it should be; but we doubt whether many teachers are in a position to make adequate use of the art treasures which are now being placed at their disposal in such profusion. This is no reflection upon the profession, for picture study and picture reading have, up to the present time, taken no place in the curriculum of our schools and colleges. It has been thought necessary that art students should study the works of the

SPRING (LAVERY).
(*From "Apollo." W. Heinemann.*)

masters, but that the ordinary cultivated man or woman should be able to see the meaning, the beauty, and the defects in the masterpieces of art has not yet fully dawned upon the consciousness of those who direct the educational affairs of the nation.

Nevertheless the day is dawning, and we can look forward with confidence to the time when a taste for pictures will be the object of as serious cultivation as a taste for literature is at the present day. It will, of course, lead to a good deal of soulless gush and pretence at first. We must of necessity pass through this stage, and we shall have various pronunciations of Botticelli, Van Hooch, Greuze, etc., hurled at us by zealous exponents of culture. But we shall eventually pass through that painful stage, and arrive at a time of true appreciation, quiet æsthetic enjoyment, and restrained keenness for the best.

Taking all these things into consideration, we extend a hearty welcome to a volume which we have just received from Mr. Heinemann. It bears the title of *Apollo: An Illustrated Manual of the History of Art throughou tthe Ages*, and is really a reissue of a book first published two years ago. The new edition has been carefully revised by the author, M. Solomon Reinach,

a number of illustrations have been added, and the whole has been brought up to date. For example, we notice in a cursory glance a reproduction of the newly-discovered "Venus" of Velasquez.

This volume forms a guide to picture-reading and classification such as every up-to-date teacher ought to possess as a work of reference. Beginning with the origin of art in remote ages, the author traces its various developments, in painting and architecture, right down to our own time. One of the first of the numerous illustrations shows a bone engraved with figures of animals—whether horses or hogs we cannot say; while among the last we have Sargent's "Duchess of Portland" and Whistler's "Little Blue Bonnet."

Of course the letterpress is condensed, and should no more be read through from cover to cover than an encyclopædia. If we might suggest to our readers a method of using it, it would be this. Jot down the names of half a dozen familiar great paintings reproduced either in a modern school book or in the many various forms now

DUCHESS OF PORTLAND (SARGENT).
(*From "Apollo." W. Heinemann.*)

familiar in the shops of our art dealers. Now refer to the index of *Apollo*, and find out what is here told of the artist—his work, his time, his method, his manner. Then using the excellent bibliography provided by the author, follow up the particular pictures in the more extensive and detailed volumes to be found in all good libraries. In this way the ordinary man or woman with a taste for the beautiful will be able to gather incidentally a good deal of useful information, and help unconsciously to foster a taste for the best.

The illustrations of the volume are of necessity small, as will be seen from the samples which we reproduce, by the courtesy of Mr. Heinemann, in our own pages. But the whole book is printed on art paper with a very fine finish, and the reproductions are in most cases gem-like and wonderfully clear. Take as an excellent example of a difficult subject that of Corot's "Morning Landscape," on page 567.

It is interesting to trace through these pages the artist's ideas of childhood, from the Christ Child of the frontispiece and the Infant Dionysius to the infant child of the Duchess of Devonshire by Sir Joshua Reynolds; to connect the earliest artistic efforts of the various races with those of our nursery days; to note the eternal family likeness between the Egyptian "mayor" and some of our own chief magistrates; to compare the Greek ideal of beauty with that of the eighteenth century in our own country; to study the anachronisms of the art of the Renaissance—for example, Christ led before Pilate by men in the garb of the Florence of Boccaccio, or the Virgin and Child in the company of the Burgomaster Meyer.

But we must refrain. The volume ought to be added to the library of every cultured man and woman.

THE BAKING VALUE OF FLOUR.

THE value of a flour to the baker depends on several distinct properties, the most important of which are (1) the amount of water a given quantity of flour will absorb in making a dough of the proper consistency for baking (this may vary from one-half to three-quarters of its own weight); (2) the volume of the loaf a given quantity will produce (which may vary more than thirty per cent.); and (3) the shape of the loaf and the colour and texture of the bread.

This baking value—or "strength," as the millers and bakers call it—has been assumed to be connected with some definite physical or chemical property of the wheat grain or flour, the percentage of gluten present being generally considered the most important factor.

This subject has recently been taken up by Mr. T. B. Wood of the Department of Agriculture, Cambridge, and he considers that these different properties are not all due to one chemical or physical factor. The investigation has so far been chiefly confined to the volume of the loaf.

In making a loaf of bread, the flour is mixed with yeast and water and allowed to ferment for some time. The yeast finds sugar in the flour, feeds on this, and converts it into alcohol and carbon dioxide. The volume of the loaf must depend either on the volume of the gas evolved or on the power of the dough to hold the gas.

To test this, various flours had their strength determined in the bakehouse. The mark 100 is given to the best flour on the market, and 0 to a flour valueless for baking purposes. The amount of carbon dioxide evolved was then determined in the following manner. Twenty grams of the flour were mixed with 20 c.c. of water and half a gram yeast added, and the mixture allowed to ferment at a temperature of 35° C., the gas liberated being measured directly. Some of the results obtained were:—

Baking value.....	90	73	68	65	45	36
CO_2 evolved in c.c.	325	274	227	205	156	131

The volume of carbon dioxide given off depends chiefly on the sugar present in the flour. In the flours experimented with the sugar present varied from 2·56 per cent. in the strongest to 1.60 per cent. in the weakest, the amount present being nearly proportional to the strength.

The addition of sugar to the flour was found to increase the volume of the loaf, the increase in a typical experiment being thirteen per cent.

These experiments show that a determination of the amount of sugar available in the dough provides a ready test for that aspect of strength which is concerned with the volume of the loaf.

NELSON'S HIGHWAYS OF HISTORY.

(See Specimens at Oxford.)

Our Modern Language Section.

PHONETICS IN THE CLASSROOM.

BY S. A. RICHARDS, B.A., GROCERS' SCHOOL, HACKNEY DOWNS.

(*Third Paper.*)

PERHAPS by this time the reader has been tempted to exclaim, "Let us drop phonetics and teach a little French for a change." In answer to a possible criticism of this sort, let me point out that a process which takes a considerable time to explain and describe often requires comparatively little in practice. If the last ten minutes of each lesson be devoted to phonetic drill, this amount of time will be found ample for the purpose. And surely it is worth while sacrificing a quarter of the lesson if we can thereby obtain a fairly accurate pronunciation. We are studying a living language, and we must, above all things, be able to speak it, not only so as to be understood—French people are, as a rule, very clever at comprehending bad French, and too polite to point out the mistakes or even sometimes to admit that there are any—but also in such a way that it may not jar upon the ears of those whose native language it is, nor proclaim too eloquently the fact that we are foreigners. It is not particularly pleasant to hear a Frenchman saying "zee" for "the," and it is a pity that he should persevere, unconsciously, in his error, as the majority of them do, when five minutes' explanation of the required tongue position would set him right. Similarly, there is no need for us, when we go to France, to advertise the fact that we are English—it is generally patent enough for other reasons—by giving *avoir* the vowel sound of the English *that*. The increased interest that pupils take in French when they once begin to pronounce it as it should be pronounced will alone repay the trouble.

But at the stage which we have now reached there should be a good deal of reading from phonetic script in the course of the lesson, apart from the drill at the end. Many suitable class-books are now published having the first twenty or thirty lessons printed in this way. It is best, in the case of beginners, not to let them see the usual orthography for at least the first three months. The script will, however, be of little use unless the correct sounds are produced and associated in the minds of the pupils with the respective symbols. The first lessons should be devoted entirely to phonetics until all the sounds have been learnt and practised. Then the class-book may be started, and ten minutes of each lesson reserved, as has been said, for drill, which will consist of the specially constructed sentences above described. When the pupils are reading from phonetic script in the course of the lesson, their pronunciation must, of course, be rigidly checked and mistakes corrected. If the class-book does not provide sufficient matter for this purpose, Passy's *Premier Livre de Lecture* may be used. Its price is thirty-five centimes, and copies are supplied at half-price to members of the *Association Phonétique Internationale*. The *Deuxième Livre de Lecture* costs fifty centimes.

We will suppose, then, that all this preliminary work has been done—that the class has mastered the sounds, and can read fluently and correctly from phonetic script. We have reached the point at which the conventional orthography must be introduced. Here we are often met with the criticism, "Does not this take a great amount of time? You spend three months in teaching one system of spelling, only in order to unteach it at the end of that period and commence teaching another. Are you not adding to the burden of both teacher and pupil?"

At the first glance there would appear to be some truth in this, but experience shows that it is not the case. Any one may convince himself of this if he will compare the pronunciation of a class which has been taught phonetically from the start with that of one that has not. In the latter case more time will be taken up in continually correcting bad habits of pronunciation—and with very little effect, too, just because they *have* become habits—than was spent in the case of the other class in laying a good foundation upon which the superstructure can be built with comparative ease. Let us see how the two systems work from the boy's point of view. The boy who has not started with phonetic script meets, for example, with the word *temps*, and forms his own idea of the pronunciation. Judging from experience, I should say that the nearest he will get is the sound [tɔm] or [tɔ̃], or even [tɔp], as in English *tongs*. He will, of course, assume that the vowel sound is identical in *loi* and *roi*, in the verbal endings *-ai* and *-ais*, in the words *et* and *est*, and so on. His teacher may take the precaution of telling him the correct pronunciation of these words, but the influence of the spelling will be constantly pulling in another direction. Moreover, in many cases he will meet with fresh words in his book which he has not yet heard pronounced, so that by the time the teacher tells him the correct pronunciation he already has a false impression stamped indelibly upon his brain. First impressions are always the strongest, and no amount of correcting will take the place of a correct idea in the first instance. Therein lies the crux of the whole matter. The first impressions must be correct. We can ensure this by the aid of phonetic script. The boy who is familiar with the word [tɑ̃] and its meaning, who has been accustomed to make use of such phrases as [bo tɑ̃], [mo·vɛ tɑ̃], will not be tempted to mispronounce the word when he learns for the first time that it is spelt *temps*. He will have the pronunciation already fixed in his mind; hence the spelling will not be a snare to him. Of course these remarks apply only to the vocabulary that the pupil has already acquired by the time he is introduced to the conventional orthography. We shall discuss the method of dealing with the pronunciation of new words later on. The points to insist on are: that, as the basis of all pronunciation teaching, the actual sounds of the lan-

guage must be analysed and scientifically studied, the use of the vocal organs involved in their production fully explained and methodically practised; next, with the aid of phonetic script, a working vocabulary must be acquired by the ear, no reference being made to the orthography, and the pronunciation of the words contained in it practised until the association between the sound and the idea has become a fixed habit.

The first step, then, in the teaching of the ordinary orthography is to give to the words of this vocabulary the customary graphic form. The sound is fixed in the pupil's mind; he now has to learn the conventional method of representing that sound. The obvious method is to go back to the beginning of the book and work through the twenty or thirty lessons which we have already taken in phonetic script, this time making use of the ordinary spelling. We may, for this purpose, either have two complete versions of our class-book, or the first twenty or thirty lessons only may be given in both forms. The pupil now learns, by means of the eye, the spelling of each of the words which he has already mastered by the ear. Dictation also now becomes a necessity. Working through the lessons thus, the class will almost insensibly pick up the spelling of the words contained in them—words already familiar as far as their sound is concerned. Frequent dictation will serve as a useful test.

We have thus advanced a stage. Our pupils are in possession of a small but useful vocabulary of words which they recognise immediately by their sound, and which they pronounce and spell correctly. How are we to proceed? To continue the process already adopted, going over every lesson twice, once in phonetic script and next in the ordinary orthography, would obviously be too slow. We must now work direct from the ordinary text. How, then, are we to guard against initial errors and consequent bad habits of pronunciation? We must make use of the knowledge gained in order to find some general principles which are to guide us when we meet with new words. French spelling is, of course, not phonetic, or we should need no special script; but there are general principles which must be known, and which are of great help in determining the pronunciation of words. This part of our study we may call orthoëpy. These general principles of orthoëpy should be derived, as far as possible, by the pupils themselves, from the concrete examples already met with. Thus they may be set to find out in how many ways the sound [o] is represented—for example, *o* as in *mot*, *ô* as in *nôtre*, *au* as in *vautour*, *eau* as in *bateau*; they may be asked why *au* has the sound [ɔ] instead of [o] in *Laurent*, *aurai*, etc., and thus to deduce the rule that *au* is pronounced [o] except when it is followed by *r*, when it is pronounced [ɔ]. The rules of orthoëpy will be considered later on. They will, at this stage, form the subject-matter of the phonetic drill at the end of the lesson. There they will be studied systematically and completely. But we cannot keep the ordinary lessons waiting till they have been worked through. It will be sufficient to deduce some of the commonest facts and broadest principles in the way indicated above before we proceed with the lessons in our class-book, making use now of the ordinary spelling.

The essential point now is that each new word as it occurs should be correctly pronounced from the outset—that there should be no false impressions to correct. In class this will be provided for by the master writing all such words on the blackboard in phonetic script and having them repeated by the class. The pronunciation of every new word should also be given in phonetic script in the class-book, so that if the pupil meets with it for the first time while he is doing his home lessons he can at once ascertain its pronunciation. In this way every fresh word—and there should not be more than a dozen or so in any one lesson—may be correctly pronounced from the first.

A useful exercise at this stage consists in the learning of poetry. A short, simple piece should be taken and read, first in phonetic script, until it is correctly pronounced. Its orthography should then be studied; it may serve as the means of pointing out general principles of orthography and orthoëpy. It should be given as dictation, and finally learnt by heart.

Still more useful, from the point of view of pronunciation, is the singing of French songs. Boys like this—a fact which increases its utility, of course. Moreover, in singing, diphthongs naturally become simple vowels, for the very sufficient reason that it is impossible to sing a diphthong—two sounds in quick succession—upon one sustained note. We notice this in the case of English singing: [ei] becomes [e], [ou] becomes [o], and *l* is pronounced very much as in French. Thus a trained singer is taught to pronounce *hail* [hel], instead of [heiul], as is customary in English. Now this diphthongisation of simple vowels is one of the chief difficulties with which we have to contend in teaching French to English—especially southern English—boys. Hence the value of French songs. There are many suitable for the purpose, such as "Au clair de la Lune," "Ma Normandie," and so on.

The question of the systematic teaching of orthoëpy on the principles which guide us in the pronunciation of a word as derived from its spelling, as far as spelling is a guide at all, must be left to the next and final paper of this series. Meanwhile, however, let me recommend the teacher who would master this part of the subject for himself—as he certainly should master it—to study Passy's *Abrégé de Prononciation Français* (Leipsig: O. R. Reisland), a most useful little book. He should also have by him the *Dictionnaire Phonétique Français*, by Michaelis and Passy (Hannover, 1897).

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FRENCH PRIZE COMPETITION.

RULES.

1. All translations should be **posted not later than April 8, 1907,** and addressed:—PRIZE EDITOR, Office of *The Practical Teacher*, 35 and 36 Paternoster Row, London, E.C.
2. Competitors should cut out and send the Coupon which appears on the Back Wrapper page of the current number.
3. Competitors should write pseudonym only on MS. Prize-winner will be asked to send name and address for publication.
4. No competitor may take the prize offered more than once in three months.

A Prize of Half a Guinea is offered for the best rendering into English of the following extract:—

Il y a des artisans ou des habiles dont l'esprit est aussi vaste que l'art et la science qu'ils professent; ils lui rendent avec avantage, par le génie et par l'invention, ce qu'ils tiennent d'elle et de ses principes; ils sortent de l'art pour l'ennoblir, s'écartent des règles, si elles ne les conduisent pas au grand et au sublime; ils marchent seuls et sans compagnie, mais ils vont fort haut et pénètrent fort loin, toujours sûrs et confirmés par le succès des avantages que l'on tire quelquefois de l'irrégularité. Les esprits justes, doux, modérés, non seulement ne les atteignent pas, ne les admirent pas, mais ils ne les comprennent point, et voudraient encore moins les imiter; ils demeurent tranquilles dans l'étendue de leur sphère, vont jusqu'à un certain point qui fait les bornes de leur capacité et de leurs lumières; ils ne vont pas plus loin, parce qu'ils ne voient rien au delà; ils ne peuvent au plus qu'être les premiers d'une seconde classe, et exceller dans le médiocre. Il y a des esprits, si j'ose le dire, inférieurs et subalternes, qui ne semblent faits que pour être le recueil, le régistre, ou le magasin de toutes les productions des autres génies; ils sont plagiaires, traducteurs, compilateurs; ils ne pensent point, ils disent ce que les autres ont pensé; et comme le choix des pensées est invention, ils l'ont mauvais, peu juste, et qui les détermine plûtot à rapporter beaucoup de choses que d'excellentes choses; ils n'ont rien d'original, et qui soit à eux; ils ne savent que ce qu'ils ont appris, et ils n'apprennent que ce que tout le monde veut ignorer, une science vaine, aride, dénuée d'agrément et d'utilité, qui ne tombe point dans la conversation, qui est hors de commerce, semblable à une monnaie qui n'a point de cours; on est tout à la fois étonné de leur lecture et ennuyé de leur entretien ou de leurs ouvrages; ce sont ceux que les grands et le vulgaire confondent avec les savants, et que les sages renvoient au pédantisme.

From the "Caractères" of LA BRUYÈRE.

RESULT OF THE MARCH COMPETITION.

The prize is awarded to "Toby." (Will "Toby" kindly forward name and address for publication?)

First Class.—E. C. A, Ty Du, Jay, Ternan, Shakspere, Agonzag, A. E. W., Frepco, M. A. F., Caudebec, Nossam, Slav, Phil, Tyro, M. O. S., Gladiator, Dim, Primus, E. S., J. G., Lytton, Baldur, Surprise, Monq, Peter Pan, Ina, En bon espoir, Perseus, Comet, Keeldeea, Mergy, St. Dié, W. T. C, Lamp of Lothian, R. H. D, Pantagruel, Rennes, La Tosca, Mary, Hodge, Colenso, E. A. C., ——, Myrtle, Glenside, Elise, K. M. C., Ella, Sheensbreck, M. A. P., Roylat.

Second Class.—Evadne, Enterprise, Caerfryddin, Valentine, J. G. H., For I hope, F. M. W., E. T., Winnowsty, S. P. R., M. A. E., Max, Roma, Snowdrop, Angelica.

The name and address of "N. R. M.," the winner of last month's competition, are—Miss Nettie Roy M'Lellan, Garnock House, Pearse Street, Brechin, N.B.

Report.

The competition produced some very good translations, but some who attempted it still seem to imagine that the French subjunctive must be translated into English by verbal expressions with the auxiliaries "may" or "should." It should be remembered that the use of the subjunctive in French is prescribed by very definite rules, and that the way in which in any particular case it must be translated into English will be determined by our usage in that particular case. *Promeneur* merely means "passer-by," and not necessarily a pedestrian, or, as one competitor, who sent in what was on the whole a good translation, rendered it, a "walker."

Prize Translation.

What difference does it make to the sightseer that countless other men have had this thought or seen this sight before him? It flashes upon him for the first time, and he feels as if he were the first to perceive it. It is more than certain that, when brought face to face with the Coliseum, numbers of other men have said, in their inmost heart at least, "It is great, it is colossal, it is enormous, but it is not beautiful." However, when he, acting upon the impulse of the moment, says the above quite frankly for the first time, he experiences a slight thrill, as if of joy, at the discovery. He calls to mind the Acropolis of Athens, and takes pleasure in comparing the characteristic features and the art of the two capitals. Athens is the city—that is to say, an entity—that her citizen loves most dearly, and which he would fain render fairer than all others. Art shall adorn this city with a beauty all her own, which will make her conspicuous above the rest. It will call into being the Parthenon, the Temple of Wingless Victory, the Erectheum. Rome, on the other hand, is the world—a world that rules, overwhelms, and dazzles; not by real beauty, but by magnificence, strength, and the vastness of her monuments. The Roman capital is no longer an individual that must be adorned, so that she may win admiration and envy; no, she is a united power, a world-wide body, willing to impose upon the vanquished the crushing testimony of her strength and greatness. There is no question now of enticing, fascinating, or pleasing, but rather of amazing the savage by what is capable of touching him—namely, the spectacle of strength and the magic spell exerted by whatever is colossal. Rome continues to produce on the Yankees and other barbarians of our day the effect which she had on those of yore. Now, if it be true that every work of art bears the impress of its century, and at the same time the stamp of its maker, then in the monuments of the Acropolis the individuality of the architect is strongly marked. This characteristic is barely discernible in the monuments of Rome, for it is crushed by the will of the emperor, who rules as the divine personification of that world organised and governed by Rome.

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OUR TUTORIAL SECTION

OUR CERTIFICATE COURSE FOR 1907.

BY GEORGE COLLAR, B.A., B.SC.,
Head-Master of Battersea Pupil-Teacher School.

Test Questions on Last Month's Work.

THEORY OF TEACHING.

1. Describe the cultivation of a small school garden, which is provided for the purpose of supplying material for use in nature-study lessons. Give a table showing what objects it would provide during each month of the year.

2. Give an outline of a series of lessons on the roots of plants.

ENGLISH LITERATURE.

1. What do you consider the chief characteristics of Milton's poetic style? Give illustrations from poems other than his *Paradise Lost*.

2. Explain the following passages:—

(*a*) Then with expanded wings he steers his flight
Aloft, incumbent on the dusky air.

(*b*) The broad circumference
Hung on his shoulders like the moon, whose orb
Through optic glass the Tuscan artist views
At evening, from the top of Fesolé,
Or in Valdarno, to descry new lands.

(*c*) Thick as autumnal leaves that strow the brooks
In Vallombrosa.

(*d*) As when the potent rod
Of Amram's son, in Egypt's evil day,
Waved round the coast, up-called a pitchy cloud
Of locusts, warping on the eastern wind.

ENGLISH HISTORY.

1. What were the immediate causes of the revolution of 1688? Mention the chief constitutional changes brought about by it.

2. Describe the steps by which James the Second endeavoured to carry out his policy for the re-establishment of Roman Catholicism.

3. What were the chief provisions of the Acts passed during the Earl of Clarendon's ministry to settle the relations between the Church of England and Dissent?

4. What connection had Louis the Fourteenth with the marriage of Charles the Second and the second Dutch war?

GEOGRAPHY.

1. Name and give the exact position of the chief ports of the German Empire, specifying any advantages and disadvantages they may severally possess.

2. Specify four of the principal industries of Germany, and say to what conditions their prosperity is due.

ARITHMETIC.

1. A quarter of my money gains 3 per cent., a third 3½ per cent., and the rest 4 per cent.; if the annual income was £64, 10s., what was the capital invested?

2. Assuming that 1 franc is 9¾d., and 5 kilograms equal 11 lbs., find which is the cheaper rate—10 centimes per 100 grams, or a penny for a quarter of a pound.

3. The sides of a rectangular field are in the ratio of 3 to 5, and the area of the field is 13½ acres. How long will it take to walk round the field at 4 miles an hour?

ALGEBRA.

1. A hare takes 5 leaps while a dog takes 4; if the hare has a start of 40 leaps, how many leaps will she take before being caught, four of her leaps being equal to three of the dog's?

2. A person can walk to a certain town and ride back in 13 hours altogether; if he walks at the rate of 4 miles an hour and rides at the rate of 6·2 miles an hour, find the distance to the town.

GEOMETRY.

1. Give the formulæ for the volume of the sphere, cylinder, pyramid, and cone.

2. What is a "great circle"? Prove that all great circles on the same sphere bisect one another, but that a great circle cannot be bisected by a small circle.

ELEMENTARY SCIENCE.

1. How would you explain to children the difference between temperature and quantity of heat?

2. What do you mean by the "coefficient of linear expansion"? How can it be determined in the case of a bar of copper?

3. What illustrations would you employ in explaining to children the three different ways of transmitting heat?

Notes and Syllabus for April.

Write essays on the following subjects:—

1. The "simple life."

2. The arguments for and against the construction of the Channel tunnel.

3. "Fear to do base, unworthy things is valour;
If they be done to us, to suffer them is valour too."

THEORY OF TEACHING.

Finish the chapter which deals with the mathematical group of studies.

In dealing with the question of hand and eye training, the teacher must beware of many pitfalls. He must carefully consider first of all what advantages his pupils can gain from such training, and then what exercises or courses he is able to introduce into his school, and then how he may best arrange those exercises so that the children may derive the greatest benefit from them. Scarcely a movement can be made which is the result of the contraction of only one muscle. When several muscles work together, it is essential that they should work harmoniously or in co-ordination, so as to accomplish a desired object. The more complicated the motion, the greater the amount of training required to perform it successfully. Again, we find that acts which in the early stages must be regarded as complex come to be regarded as simple acts as the result of training and practice. As an illustration, consider such a complicated action as riding a bicycle. Think of the number of muscles that have to be co-ordinated in order to preserve the balance. And, again, when an act has been performed voluntarily and consciously a certain number of times, it comes to be performed mechanically, and may be regarded almost as a reflex act. When the beginner on the bicycle sees a stone in the road, he realises that he should avoid it, and that to do so he must pull one handle and push the other in order to turn his machine. Even after the most careful thought, he may actually run into the obstacle he is anxious to avoid. But with practice his hand and eye work together so effectively that the very impression made on the eye by the object is sufficient to cause the hands to turn the machine aside by the right amount, and that without the rider being conscious of the steps he has actually taken to accomplish his object. One object, then, in manual training is to develop the power of co-ordination—to train the different muscles to act together, and that without the apparently conscious direction of the brain. Think of the complicated nature of such an act as taking a stitch in needlework. The eye has to observe the spot in which the needle has to be thrust; many muscles work together to hold the needle and to push it forward; then the hand has to move to the other side and seize the needle and draw it through. Want of co-ordination results in pricking the finger and in untidy work. One has only to compare the tedious stitching of an infant with the rapid work of an expert needlewoman to see the value of the training in co-ordination of hand and eye.

But this manual dexterity is not the only thing to be acquired by hand and eye training: the teacher must insist on accuracy of work. If a boy planes a piece of wood, he must try it with a straight-edge to see whether the surface is true and even. His eyes become more and more trained to correctness of form. Again, he learns to appreciate beauty of form: the result of being brought up among squares, levels, and perpendiculars is to make the pupil feel uncomfortable and unhappy if the pictures on the walls are not hung straight or if things are not placed squarely on the table. That there is a moral value in this training is shown by the connection between the terms used in denoting this correctness of form and position and those referring to conduct. Thus we speak of honest conduct as "straight," and an honest man as "straightforward;" a straight line is a *right* line, straightforward conduct is *right*. Again, improper conduct is *wrong*—a word derived from the verb "wring," meaning to twist. Compare also the French words *droit*, right or straight, and *tort*, wrong or twisted. But there is another moral result accruing from manual exercises: the pupil has the pleasure of seeing what he has done and of showing his work to his friends. There is always a great satisfaction in seeing the results of one's labour. If the pupil studies such a subject as history, he may have great difficulty in estimating the result of his work, or may even think there is no result; so there is a moral encouragement resulting from manual training as compared with purely intellectual training. At the same time, this tangible result forms one of the dangers in this kind of work, for both teacher and pupil are tempted to regard the object produced as the aim of the teaching, while the real aim is the development of the pupil. We do not propose to deal with these subjects in detail, as they are generally in the hands of special teachers, with the exception of needlework.

English Literature.

For general reading take the *Golden Treasury*, Book III., to the end of number 182, and take in addition numbers 187, 199, and 201. These will complete the poems by Thomas Gray which are given in the collection.

The poetry of the eighteenth century, with which this book deals, is of a higher general level than that of the century which preceded it, although the three great poets, Shakespeare, Milton, and Dryden, who wrote in the seventeenth century, had passed away, the last of the three dying on May 1, 1700. A change had come over the *form* of poetry, for among the Elizabethan poets vast numbers of patterns were in use in constructing the stanzas. Poets seemed to aim at new combinations by altering the number of syllables in the line, and of lines in the stanza. But Edmund Waller (1605–87) set the fashion of regularity in poetry by reviving the ten-syllable couplet which Chaucer had used with so much skill and success, and which had been practically out of use since 1450. The great French critic stamped this as the classic literary form, and it is really owing to the fact that Pope came so much under its influence that we can read so little of his poetry at one sitting without feeling tired. After the death of Pope a strong tendency set in towards the study of nature. Young, the author of *Night Thoughts*, formed a sort of connecting link; but the real founder of the nature school was James Thomson, author of 158, "Rule Britannia," and 172.

William Collins was a friend and admirer of Thomson, and when the latter died Collins wrote an exquisite elegy, beginning,—

"In yonder grave a Druid lies."

The *Ode to Evening* and the *Ode Written in* 1746 are very popular, and show Collins's mastery over the delicate art of melody. *The Passions* affords a splendid exercise for recitation, owing to the close connection between the words and the ideas they express. At the early age of thirty-one Collins became a victim to fits of melancholy, and then became hopelessly insane. After five years of mental suffering he passed away at Chichester, his native town. The greatest lyric poet of the age was Thomas Gray, and in the preface to the *Golden Treasury* the compiler associates the period with the name of Gray.

He did much to popularise the ode, which was a form of poem much neglected at that time in England. The chief writer of odes among the Greeks was Pindar, and Gray was a careful student and imitator of Pindar—*The Bard* is especially entitled a "Pindaric Ode"—and in recognition of his pre-eminence as a writer of odes, his epitaph in Westminster Abbey closes with the statement that Britain

"Felt a Homer's fire in Milton's strains,
A Pindar's rapture in the lyre of Gray."

At first sight there seems to be a close resemblance between the works of Collins and those of Gray. Both adopted the same forms for their verses—those of the Greek ode—and both were extremely fond of allegory and personification. But there is a greater freedom in the poetry of Collins, and a greater finish in that of Gray. Collins seems as though he wrote spontaneously, and poured forth "his unpremeditated lay" without hesitation. Gray, on the other hand, had an extremely delicate ear and a keen sense of fitness, which made him take a vast amount of pains over his writings before he could satisfy himself. He is said to have spent seven years over the *Elegy*. The result is that his verse is faultless, and his expressions the best that can possibly be found for the ideas he wishes to convey. Gray's position among English poets, in spite of the relatively small amount he wrote, is a very high one. The *Elegy* is the finest poem in the school of Thomson, and in the *Odes* Gray shows that he refused to follow the rules for rhyming couplets which bound his contemporaries, and preferred the freer models of Greek verse, of which he possessed a very deep knowledge. Shelley, as a writer of odes, is no doubt deeply indebted to Gray. In his temperament and disposition Gray had a strong yearning for solitude, which is reflected in his poems, as is also a certain pessimistic spirit, particularly in the *Ode on a Distant View of Eton College*.

Prepare in detail the first book of *Paradise Lost*, from line 522 to the end.

543. *Chaos*—that is, confusion. The term is applied to the disordered state of the world before order was introduced; then it became Cosmos, the orderly world.

546. *Orient colours*, literally Eastern colours. Latin, *oriens* = rising, hence orient = the land of the rising sun, the east; so that "orient colours" may refer to the colours of the sky at sunrise. But the pearls from the East were spoken of as orient pearls, and so the expression may mean "coloured like orient pearls."

550. *Phalanx*, the battle array of the Greeks, who depended for success upon the shock of their onslaught, and arranged their soldiers in compact masses. The phalanx at first was five ranks deep, but the number was afterwards increased.

Dorian mood. The tones and semitones of the natural scale follow one another in a fixed order, but any one might be taken as the tonic or starting note. The two "moods" or modes generally employed in modern music are called the major and minor modes, and begin on *doh* and *lah* respectively. In ancient times other notes were used as key notes; if *ray* was the keynote, the mode was described as the "Dorian mood" or mode. "John Anderson, my Jo" is really a melody in the *ray* or Dorian mode.

573. *Since created man* = since man was created. This is one of those Latin constructions of which Milton was so fond.

575. *Small infantry*, the Pygmies, a nation of dwarfs warred on by cranes every spring-time. The idea, suggested no doubt by frogs, is found in Homer and other writers. The adventures of Hercules among the Pygmies suggested Swift's description of Gulliver among the Lilliputians.

578. *Thebes and Ilium*. The references are to the war of the "Seven against Thebes," which forms the subject of one of the tragedies of Æschylus, and to the war waged by the Greeks against Troy, or Ilium, as they called it.

580. *Uther's son*—that is, Arthur, the mythical British king.

582–3. *Aspramont.....Trebisond*, places famous as the scenes of battles in the crusades.

585. *Biserta*, on the north coast of Africa. The Saracens crossed from Africa, conquered Spain, and defeated Charlemagne at Fontarabia, near the Pyrenees.

592. *Her*. We should say "its;" but as the Latin *forma* is feminine, Milton uses "her."

609. *Amerced*, deprived of the reward.

665. *Cherubim*, the plural of cherub.

670. *Grisly*, horrible. Compare—

"On yonder cliffs, a grisly band,
I see them sit, they linger yet,
Avengers of their native land."
GRAY'S *Bard*.

The word is often confused with "grizzly," which means grayish—for example, the *grizzly* bear.

684. *Vision beatific*, a vision that makes one blessed.

690. *Admire*, here used in its original sense, "to wonder."

694. *Memphian kings*, the Egyptian kings who built the pyramids. Memphis, a great city in ancient Egypt, and second only to Thebes, was about ten miles from the pyramids.

713–6. Notice the architectural terms employed:—*Pilasters*, square pillars or segments of pillars attached to walls; *Doric pillars*, the simplest of the Greek pillars, the capital consisting only of rings; *architrave* (a hybrid word, from Greek *archi*, chief, and Latin *trabs*, a beam), the beam which passes from pillar to pillar and supports the *frieze*, which is surmounted by

a projecting moulding called the *cornice*. The three parts—*architrave*, *frieze*, and *cornice*—make up the *entablature*, as we call the entire part that rests on the pillars.

717. *Fretted gold*, sheet gold cut or pierced into an open-work pattern. (Anglo-Saxon *fretan*, to eat out.)

739. *Ausonian land*, Italy; *Mulciber*, Vulcan, the god of the forge.

745. *Zenith*, the point in the heavens immediately overhead.

756. *Pandemonium*, the abode of "all the demons."

764. *Wont ride*, were wont to ride.

766. *Panim*, or Paynim = pagan. The term is frequently used in accounts of the crusades to denote the Saracens.

786. *Arbitress*, strictly a judge, but sometimes, as here, a witness. Luna (the moon) being feminine, Milton uses the feminine form, and not *arbiter*, the masculine.

795. *Conclave*, a meeting carried on with locked doors. (Lat. *clavis*, a key.)

English History.

Study the reign of William the Third. The important constitutional changes, or rather settlements, connected with the Bill of Rights should be thoroughly mastered. The internal politics are easily mastered from the text-books, but in order to understand the course of foreign affairs a book of European history should be studied. The English student often assumes that the cause of the hostility between William and Louis the Fourteenth was the support given by the latter to the Jacobites. This was, however, not so much a cause of the hostility as a means of showing it.

For ten years after the peace of Nimwegen (1678) France was at peace; but Louis extended his power over the unsettled little states on the Rhine, and seized the free city of Strassburg. He also made a great mistake in his treatment of the Huguenots. After a period of dragooning and other forms of persecution, he revoked the Edict of Nantes, which had guaranteed certain liberties. Protestants were thus declared outlaws, and their ministers liable to the death penalty. This caused large numbers to leave France and settle in England and elsewhere, carrying with them their skill and industry, and introducing new trades, into the countries in which they settled.

The text-books generally set out the causes of the War of the Spanish Succession very clearly; learn them carefully.

In spite of the fierceness with which this war was waged, it is important to notice that during this period attention was being paid to the rights of neutrals, and to the treatment of ambassadors and prisoners. The first important treatise on international law was published by Grotius in 1625, while the sanguinary Thirty Years' War was raging, and was entitled *War and Peace*. Another important work, *On the Law of Nature and Nations*, was published in 1672 by Pufendorf. These books did much to instil into men's minds those principles which make such meetings as the Hague Conference possible, and will eventually lead all nations to settle their differences without having recourse to war.

Geography.

Study the geography of Holland and Belgium, Denmark, Norway, and Sweden. Notice the relation of Holland and Belgium to France and Germany. Physically they are most closely related to France, for the physical features of France run through Belgium into Holland—for example, the Ardennes, the Meuse, and the coalfields. The boundaries are, on the whole, artificial. In Belgium and Holland, especially the latter, the waterways are of great importance. Their seaports are important because they have the German industrial Rhine provinces as their hinterland, and Antwerp has also the manufacturing district of Belgium.

Remember that as cows are fond of water and moist meadows, Holland and Denmark are admirably fitted for dairy-farming; and the adoption of co-operative systems of working have led to the production of enormous quantities of Dutch and Danish butter and cheese.

Arithmetic.

Study chaps. xlvi., xlvii., and xlviii. The last is especially useful to those who are taking science. Problems on motion and on clocks are so frequently set in examination papers that the student must study them systematically.

Algebra.

Study chap. xix., and work the examples. For the sake of practice some of the earlier examples should be worked by each of the three methods given; after this the student will be able to judge which is the best method to adopt in each case.

Geometry.

The student who has studied some elementary mechanics will be interested in applying the rules of Guldinus to the determination of the volume of the sphere, cone, and cylinder. These figures are known as solids of revolution, because they are formed by the revolution of plane figures about one of their sides as axes: thus, if a semicircle revolve about the diameter, it traces out a sphere; if a right-angled triangle revolve about one of its sides, it describes a cone; while a rectangle revolving about its side describes a cylinder.

The rules above referred to tell us that the volume of any such solid figure is equal to the product of the area of the plane figure, whose revolution produces the solid, multiplied by the path of its centre of gravity. Thus in the case of a cone, the area of the right-angled triangle is half the radius of the base multiplied by the height, and the centre of gravity is at a distance from the axis equal to one-third of the radius; so its path is $\frac{2\pi r}{3}$. Therefore the volume of the cone is

$$\frac{r}{2} \times h \times \frac{2\pi r}{3} = \frac{\pi h r^2}{3}.$$

Elementary Science.

Study the section on light, and work experiments.

The first fact to be grasped is that as long as light is travelling in the same medium it travels in straight lines; hence the impossibility of seeing round a corner, and the possibility of telling exactly where the shadow of a body will fall. Take an unlighted candle and an opaque object of simple form in a fixed position, and by the help of a long ruler or straight rod mark on the table or wall the places where the light will be cut off by the object. Then light the candle and verify your result.

As a rule, practical problems on light are complicated by the fact that the source of light is not a point, but a surface of considerable size—for example, a gas flame or candle flame. If we trace out the shadow that would be cast by an object, we find that a part of the shadow cast by one portion of the flame falls in the place which is illuminated by some of the other parts, and hence is only a partial shadow. This fringe of partial shadow is called the *penumbra*, to distinguish it from the *umbra*, or perfect shadow (Lat. *pene* = almost; compare peninsula). When the body which casts the shadow is small compared with the source of light, and the surface on which the shadow is cast is at a good distance, the penumbra will form a very wide band indeed. This is the case with all shadows cast by the sun, and the fact is important in studying eclipses of the moon. If a small stick, such as a lead pencil, be held close in front of a wall on which the sun is shining, its shadow will appear sharp and well defined; but if it is moved a little distance away, the shadow will consist of a dense part in the middle with a band of penumbra on each side. This faint band will get wider and the dark middle band will get narrower as the pencil is moved farther and farther from the wall, until at last there is no true *umbra* at all. In the case of an eclipse of the sun the moon's shadow sweeps over the surface of the earth. If a person sees a total eclipse of the sun, he must be in the *umbra*, for no light from any part of the sun can reach him; it is all cut off by the moon. In the case of a partial eclipse, the observer is in the *penumbra*, for light comes to him from some parts of the sun, although the light coming from other parts is cut off. If the moon happens to be in the part of her orbit which is most remote from the earth at a time when the centres of the earth, moon, and sun are in nearly the same straight line, her distance from the earth is too great for any part of the *umbra* to fall on the earth's surface, and the shadow consists entirely of *penumbra*. A person standing near the middle part of the shadow would then receive light from all the outer edge of the sun's disc, while the middle portion would be obscured by the moon. An eclipse of this kind is called an "annular" eclipse (Lat. *annulus*, a ring). Study the laws of reflection of light at plane and spherical surfaces. Note the different kinds of images formed, erect or inverted, real or virtual, enlarged, same size, or diminished, and the conditions which determine the kind in each case.

Next observe that the rule for the *rectilinear* propagation of light is true only when the rays are travelling through the same medium. When they pass from one medium to another they are bent or *refracted*. Study the laws of refraction at plane surfaces, then at spherical surfaces. Account for the apparent loss of depth in a vessel filled with water; trace the movement of the shadow of the side of a vessel as water is poured into it. Study the formation of images by simple lenses, and note the different kinds of lenses which produce the different varieties of images.

OUR QUERY COLUMN.

RULES.

1. Each correspondent is restricted to *one* question.
2. Each query must be accompanied by the name and address of the correspondent, and the *coupon* which appears on the back wrapper of the current number of the Journal.
3. CORRESPONDENTS MUST IN ALL CASES STATE THE SOURCE FROM WHICH THEIR QUERY HAS BEEN OBTAINED.

The editor reserves to himself the right to decline to answer any question which is, in his judgment, unsuited to the Magazine.

Orion.—Given $x(y^2 - z^2) = 16$, $y(z^2 - x^2) = 72$, $z(x^2 - y^2) = 40$, find x, y, z. (O'Dea's *Algebra*.)

Multiplying the first of the given equations by x, the second by y, and the third by z, we have, on adding,

$$x^2y^2 - z^2x^2 + y^2z^2 - x^2y^2 + z^2x^2 - y^2z^2 = 16x + 72y + 40z.$$

$$\therefore 16x + 72y + 40z = 0.$$

$$\therefore 2x + 9y + 5z = 0. \quad . \quad . \quad . \quad (1)$$

Again, dividing the first of the equations by x, the second by y, and the third by z, we have, on adding,

$$y^2 - z^2 + z^2 - x^2 + x^2 - y^2 = \frac{16}{x} + \frac{72}{y} + \frac{40}{z}.$$

$$\therefore \frac{16}{x} + \frac{72}{y} + \frac{40}{z} = 0.$$

$$\therefore \frac{2}{x} + \frac{9}{y} + \frac{5}{z} = 0. \quad . \quad . \quad . \quad . \quad . \quad (2)$$

From (1) we have $2x + 9y = -5z$.

From (2) we have $\frac{2}{x} + \frac{9}{y} = -\frac{5}{z}$.

Hence, on multiplying, we have

$$(2x + 9y)\left(\frac{2}{x} + \frac{9}{y}\right) = 25.$$

$$\therefore 18x^2 + 85xy + 18y^2 = 25xy.$$

$$\therefore 18x^2 + 60xy + 18y^2 = 0.$$

$$\therefore 3x^2 + 10xy + 3y^2 = 0.$$

$$\therefore (3x + y)(x + 3y) = 0. \quad . \quad . \quad . \quad . \quad (3)$$

Similarly, on eliminating x between (1) and (2), we have

$$45y^2 + 102yz + 45z^2 = 0.$$

$$\therefore (3y + 5z)(5y + 3z) = 0. \quad . \quad . \quad . \quad . \quad . \quad (4)$$

From (3) we have $x = -\frac{y}{3}$. . . . . (5)

or $x = -3y$. . . . . (6)

From (4) we have $z = -\frac{5}{3}y$. . . . . (7)

or $z = -\frac{3}{5}y$. . . . . (8)

Writing in the equation

$$y(z^2 - x^2) = 72$$

the values x and z given in (5) and (7), we have

$$y\left(\frac{25}{9}y^2 - \frac{y^2}{9}\right) = 72.$$

$$\therefore y^3 = 27.$$

Hence we have

$$\left.\begin{aligned} y &= 3 \\ z &= -5 \\ x &= -1 \end{aligned}\right\}.$$

And these values satisfy each of the given equations.

Similarly, by taking the remaining pairs of values of z and x given by the results stated in (5), (6), (7), and (8), we obtain other sets of values of x, y, z. The sets which do not satisfy all the given equations must be rejected.

Mat.—The two ends of a train moving with a constant acceleration pass a certain point with velocities u, v respectively; with what velocity does the centre of the train pass the same point? (Inter. Science, 1906.)

Of the two given velocities u and v, let v be the greater. Let l be the length of the train, and suppose it passes the given point in the time t. Then, since the acceleration is uniform, we have

$$\frac{v + u}{2} \cdot t = l.$$

Now, let V be the velocity of the train when its centre is passing the given point. Then, since the train has travelled through the length $\frac{l}{2}$ since its velocity was u, we have

$$V^2 - u^2 = 2f \cdot \frac{l}{2} = fl,$$

where f is the constant acceleration.

But $f \cdot t = v - u$.

$$\therefore f = \frac{v - u}{t}.$$

And we have seen that $l = \frac{v + u}{2} \cdot t$.

$$\therefore V^2 - u^2 = \frac{v - u}{t} \cdot \frac{v + u}{2} \cdot t.$$

$$\therefore V^2 - u^2 = \frac{v^2 - u^2}{2}.$$

$$\therefore V^2 = \frac{v^2 + u^2}{2}.$$

$$\therefore V = \sqrt{\frac{v^2 + u^2}{2}}.$$

Gwilym.—A heavy uniform rod of length $2a$ lies over a rough peg with one extremity leaning against a rough vertical wall. If c be the distance of the peg from the wall, and λ be the angle of friction both at the peg and the wall, show that when the point of contact of the rod with the wall is above the peg, then the rod is on the point of sliding downwards when

$$\sin^2\theta = \frac{c}{a}\cos^2\lambda,$$

where θ is the inclination of the rod to the wall. If the point of contact of the rod and wall be below the peg, prove that the rod is on the point of slipping upwards when

$$\sin^2\theta \sin(\theta - 2\lambda) = \frac{c}{a}\cos^2\lambda,$$

and on the point of slipping downwards when

$$\sin^2\theta \sin(\theta + 2\lambda) = \frac{c}{a}\cos^2\lambda.$$

(Loney's *Statics*.)

Let AM represent the wall, AB the rod, C its middle point, P the peg. Fig. 1 represents the case in which A, the point of contact of the rod with the wall, is above P.

Draw the horizontal line AH. Draw AD, making the angle λ with AH, and let CD, the vertical through c, intersect CD in D. Join PD. Then DC is the direction of the

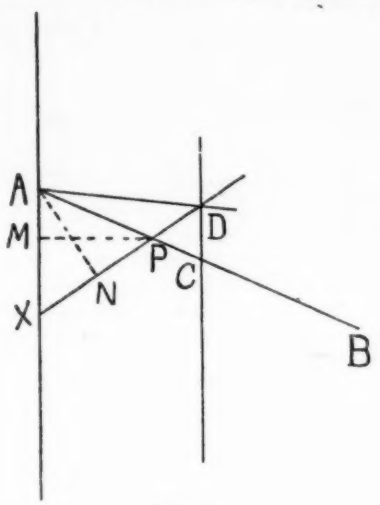


FIG. 1.

weight of the rod, PD the direction of the reaction of the peg, and DA the direction of the reaction of the wall. Draw PM perpendicular to the wall and AN perpendicular to DP. Then the angle $APD = (90° + \lambda)$, the angle $PAD = (90° - \theta - \lambda)$, and therefore the angle $PDA = \theta$. Also the angle $MAD = (90° - \lambda)$.

Produce DP to meet the wall in X.

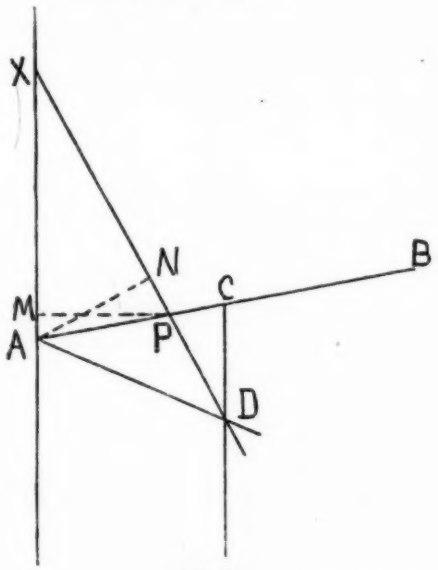


FIG. 2.

Let W denote the weight of the rod and R the reaction of the peg. Then, since the sides AX, XD, DA of the triangle AXD are respectively parallel to the direction of the weight, the reaction of the peg, and the reaction of the wall, therefore

$$\frac{W}{R} = \frac{AX}{XD} = \frac{\sin XDA}{\sin DAX}.$$

$$\therefore \frac{W}{R} = \frac{\sin\theta}{\sin(90° - \lambda)} = \frac{\sin\theta}{\cos\lambda}. \quad . \quad . \quad . \quad (1)$$

Taking moments about A, we have

$$Wa \sin\theta = R \,.\, NA.$$

But $NA = AP \cos NAP = AP \,.\, \cos\lambda$,

and $AP = PM \operatorname{cosec}\theta = c \,.\, \operatorname{cosec}\theta$.

Hence $Wa \sin\theta = R \,.\, c \operatorname{cosec}\theta \,.\, \cos\lambda$.

$$\therefore \frac{W}{R}\sin\theta = \frac{c\cos\lambda}{a\sin\theta}.$$

$$\therefore \frac{\sin\theta}{\cos\lambda}\,.\,\sin\theta = \frac{c\cos\lambda}{a\sin\theta}.$$

$$\therefore \sin^3\theta = \frac{c}{a}\cos^2\lambda.$$

Fig. 2 represents the case in which A is below P, and the rod is on the point of slipping upwards.

Here the angle $APD = (90° + \lambda)$, $XAP = \theta$. Hence $AXD = (90° + \lambda - \theta)$, and $XDA = (\theta - 2\lambda)$. Also, $XAD = (90° + \lambda)$.

We have therefore $\frac{W}{R} = \frac{\sin(\theta - 2\lambda)}{\sin(90° + \lambda)} = \frac{\sin(\theta - 2\lambda)}{\cos\lambda}$. (2)

Taking moments about A, we get, as before,

$$\frac{W}{R}\,.\,\sin\theta = \frac{c}{a}\frac{\cos\lambda}{\sin\theta}.$$

$$\therefore \frac{\sin(\theta - 2\lambda)}{\cos\lambda}\,.\,\sin\theta = \frac{c}{a}\frac{\cos\lambda}{\sin\theta}.$$

$$\therefore \sin^2\theta \,.\, \sin(\theta - 2\lambda) = \frac{c}{a}\cos^2\lambda. \quad . \quad . \quad . \quad . \quad . \quad . \quad (3)$$

The case in which the rod is slipping downwards differs from the last in the sign of λ only, which here becomes negative. For it is obvious that the angle DAX is now equal to $90 - \lambda$, and the angle APD equal to $90 - \lambda$.

Hence for this case equation (3) becomes

$$\sin^2\theta \,.\, \sin(\theta + 2\lambda) = \frac{c}{a}\cos^2\lambda.$$

Cornubia.—Solve the equations—

$$\begin{cases} x^2 - z(2y + z) = b^2. \\ y^2 - z(2x + z) = a^2. \\ a + x = b + y. \end{cases}$$

(*Algebraical Exercises*, Jones and Cheynes.)

$$x^2 - 2yz - z^2 = b^2. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

$$y^2 - 2xz - z^2 = a^2. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

$$x - y = b - a. \quad . \quad . \quad . \quad . \quad . \quad . \quad (3)$$

From (1) and (2) we have

$$x^2 - y^2 - 2z(y - x) = b^2 - a^2. \quad . \quad . \quad . \quad . \quad (4)$$

Dividing (4) by (3), we have

$$x + y + 2z = a + b.$$

But $x - y = -a + b$.

$$\therefore 2(z + x) = 2b.$$

$$\therefore z + x = b.$$

$$\therefore z = b - x,$$

and $y = x + a - b$.

Substituting these values for y and z in the first of the given equations, we have

$$x^2 - 2(b - x)(x + a - b) - (b - x)^2 = b^2;$$

and this reduces to

$$x^2 + (a - b)x - ab = 0,$$

or, $(x + a)(x - b) = 0$.

Hence $x = b$ or $-a$.

If $x = b$, $z = 0$ and $y = a$.

If $x = -a$, $z = a + b$, and $y = -b$.

Hence $\left.\begin{matrix} x = b \\ y = a \\ z = 0 \end{matrix}\right\}$ or, $\left.\begin{matrix} x = -a \\ y = -b \\ z = a + b \end{matrix}\right\}$.

G.B.—A man left one-third of his property and £1,000 to his eldest son, half of the remainder and £1,000 to the second, the rest to his third, who had £2,500. Find the value of his property. (Lock's *Arithmetic*.)

The first son has £1,000 + one-third of the whole property. The second son has £1,000 + one-half of two-thirds of the property, less one-half of £1,000.

The second son has therefore £500 + one-third of the whole property.

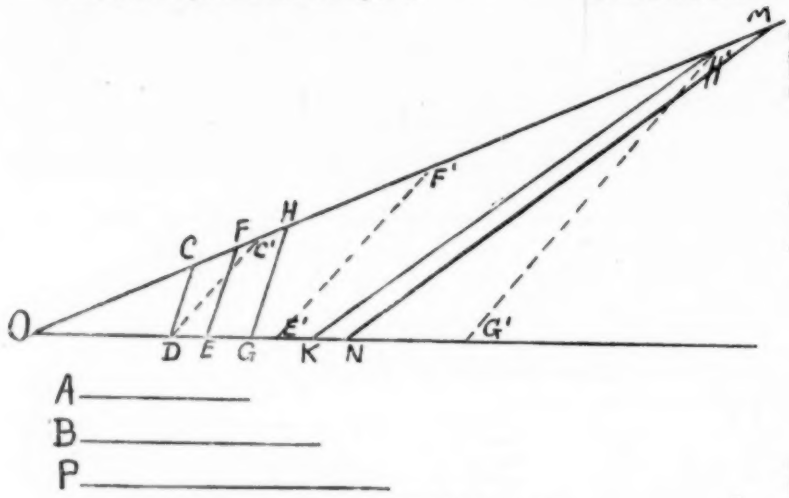
There remains for the third son one-third of the whole property, less £1,500.

Hence one-third of the property, less £1,500, amounts to £2,500. Therefore one-third of the property amounts to £4,000.

The value of the property is therefore £12,000.

Maths.—If A, B, P are three given lines, show how, by a geometrical construction, to draw a line Q such that A^3 may be to B^3 as P to Q. (Stage 3, 1906.)

Take two straight lines intersecting at O.



Take OC = A, OC^1 = B, ON = P. Take OD = L, any convenient length.

Join CD. Take OE = OC and draw EF parallel to DC. Take OG = OF and draw GH parallel to EF.

$$\text{Then } \frac{OH}{OG} = \frac{OC}{OD} = \frac{A}{L},$$

$$\text{and } \frac{OF}{OE} = \frac{OC}{OD} = \frac{A}{L}.$$

$$\therefore \frac{OH}{OG} \cdot \frac{OF}{OE} = \frac{A^2}{L^2}.$$

But OG = OF, and OE = OC = A.

$$\therefore OH = \frac{A^3}{L^2}.$$

Similarly, take OE^1 = OC^1 and draw E^{1}F^1 parallel to DC^1. Take OG^1 = OF^1 and draw G^{1}H^1 parallel to E^{1}F^1.

$$\text{Then } OH^1 = \frac{B^3}{L^2}.$$

$$\text{Hence } \frac{A^3}{B^3} = \frac{OH}{OH^1}.$$

Take OK = OH and join KH^1. Draw NM parallel to KH^1.

$$\text{Then } \frac{ON}{OM} = \frac{OK}{OH^1} = \frac{OH}{OH^1} = \frac{A^3}{B^3}.$$

But ON = P. $\therefore \dfrac{P}{OM} = \dfrac{A^3}{B^3}$.

Hence OM is of the required length Q, such that A^3 is to B^3 as P is to Q.

Dawett.—Show that if the recurring part of a mixed circulating decimal is divisible by 9, the equivalent fraction can be reduced to lower terms. (Haugh's *Higher Arithmetic.*)

Let a denote the non recurring part and r the recurring part of a mixed circulating decimal. Suppose a consists of m digits and r of n digits; then the equivalent fraction is expressed by

$$\frac{(a \times 10^n + r) - a}{(10^n - 1) \times 10^m},$$

since it is obvious that $(10^n - 1)$ is a number consisting of n nines.

The above fraction may be written in the form

$$\frac{a(10^n - 1) + r}{(10^n - 1) \times 10^m}.$$

Then since $(10^n - 1)$ is divisible by 9, and, by the question, r is also divisible by 9, it follows that both numerator and denominator of the equivalent fraction are divisible by 9. Therefore the equivalent fraction can be reduced to lower terms.

Bryn.—This is a book-work question. The proposition is given in any standard work on Dynamics. See, for example, Hicks's *Elementary Dynamics*, § 159; Thomson and Tait's smaller work on *Natural Philosophy*; or Everett's *Vibratory Motion and Sound.*

Rollo.—Through a given point O a straight line is drawn to cut two given straight lines in R and S. Find the locus of a point P on this variable straight line which is such that

(1) $2 \cdot OP = OR + OS$,

and (2) $OP^2 = OR \cdot OS$.

(Loney's *Co-ordinate Geometry.*)

From (1) we have

$$4 \cdot OP^2 = OR^2 + 2OR \cdot OS + OS^2 \ldots (3)$$

From (2) we have

$$4 \cdot OP^2 = 4OR \cdot OS. \quad \ldots \ldots (4)$$

From (3) and (4) we have

$$OR^2 - 2OR \cdot OS + OS^2 = 0.$$

$$\therefore (OR - OS)^2 = 0.$$

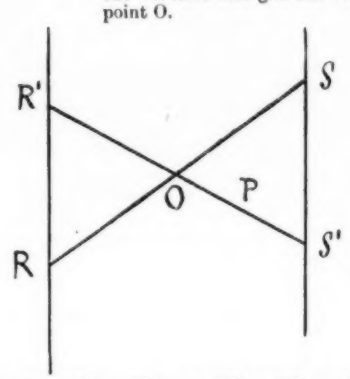
$$\therefore OR = OS.$$

Then from (1) it follows that

$$OP = OR = OS.$$

Hence P must coincide with R or S.

Let RS, R^{1}S^1 be two positions of the variable straight line through the point O.



Then, since OR = OS, and OR^1 = OS^1, and the angle ROR^1 = the angle SOS^1, therefore RR^1 is parallel to SS^1.

Hence the locus of P is a pair of parallel straight lines.

J. Short.—A tradesman's stock-in-trade is valued on January 1, 1868, at £8,000. He has also £350 in cash, and owes £1,870. During the year his personal expenses, £300, are paid out of the proceeds of his business, and on January 1, 1869, his stock is valued at £7,950, he has £570 in cash, and he owes £1,510. What is the whole profit on the year's transactions, after deducting 5 per cent. interest on the capital with which he began the year? (Pendlebury's *Arithmetic.*)

January 1, 1868—Stock	£8000	
Cash	350	
Capital	£8350	
Money owed		£1870
January 1, 1869—Stock	£7950	
Cash	570	
Capital	£8520	
Money owed		£1510
Capital increased by £8520 − £8350 =		£170
Debt reduced by £1870 − £1510 =		£360
Personal expenses		£300
Total gain during year		£830
Deduct 5 per cent. interest on £8350 =		£417 10s.
Whole profit on the year's transactions		£412 10s.

We have had the pleasure of examining an advance copy of the Official Souvenir of the Oxford Conference, published by Sir Isaac Pitman and Sons. It is beautifully produced, and as a guide to Oxford will be well worth keeping long after the Conference is over.

OUR SCIENCE SECTION

Subscribers requiring Explanations of Difficulties in any branch of Science, or Advice upon Courses of Study, can obtain all help required by communicating with the Editor, and accompanying their query with the Coupon cut from this number.

NOTES ON PHYSICS.

BY EDWIN EDSER, A.R.C.SC.,

Author of "Heat for Advanced Students," "Light for Students," "Differential and Integral Calculus for Beginners," etc.

Light.

Optical Constants of Thick Lenses and Systems of Lenses.—The laws relating to the formation of images by thick lenses and systems of lenses are not so generally known as those relating to the formation of images by thin lenses. This is to a great extent due to the fact that the laws relating to thick lenses and lens systems are generally developed on purely mathematical lines, and the student who is not a capable mathematician fails to grasp the physical significance of the reasoning employed, and so loses interest in the investigation. The subject may, however, be treated from a physical point of view, all the necessary results being obtained without any complicated mathematical analysis. In these circumstances the student not only finds it easy to understand the reasoning used, but the methods of obtaining practically the various constants readily suggest themselves. I shall now proceed to develop the laws relating to thick lenses and lens systems on these lines.

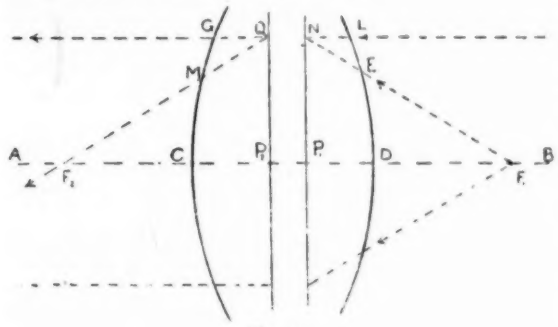


FIG. 1.

Let us suppose that the centres of curvature of a number of surfaces separating media of different refractive indices are situated on the line AB (Fig. 1). This line is said to be the common axis of the various surfaces, and the surfaces are said to be co-axial. In the case of a single thick lens there will be two surfaces separated from each other by an appreciable distance, and enclosing a medium of high refractive index, say glass; but in general we may suppose that there are any number of co-axial surfaces. If, now, rays of light initially parallel to the axis are rendered convergent by passing through the system, the system is said to be *convergent*; if the rays are rendered divergent, the system is said to be *divergent*.

Let us suppose that all the surfaces lie between the points C and D (Fig. 1), and that they form a convergent system. It will be possible to find a point, F_1, on the positive side of the system such that rays diverging from F_1 will be rendered parallel to the axis by passing through the system. (The positive direction is defined as that opposite to the direction in which the light travels.) We do not know the path of these rays in the space between D and C, but it is sufficient to know the initial path F_1E and the final path GH of a ray. The point F_1 is called the *first principal focus* (or the *first focal point*) of the system.

Any ray which is initially parallel to the axis will give rise to a ray which cuts the axis in a point F_2 after passing through the system. Let us choose a ray KL parallel to the axis, and as far from it as the ray GH; then KL will give rise to a ray MF_2, passing through F_2. The point F_2 is called the *second principal focus* (or the *second focal point*) of the system.

Produce the rays F_1E and KL till they meet at some point N, and produce the rays MF_2 and GH backwards till they meet in some point Q. Then the rays KN and F_1N give rise to the rays QF_2 and QH. We may consider KN and F_1N to be the rays bounding a pencil converging toward N, while QF_2 and QH are the rays bounding a pencil diverging from Q. If the lens system were removed, N would be a real image of a luminous point. This real image acts as object to the lens system, and gives rise to a point image Q on the same side of the axis, and as far from this as N.

We may now in a similar manner find a number of points between N and the axis such that a pencil of rays converging towards any one of them gives rise to a pencil diverging from a corresponding point between Q and the axis, both these points being equidistant from the axis. If N is fairly near to the axis, all such points between N and the axis will lie in a plane perpendicular to the axis, and the points between Q and the axis will lie in another plane perpendicular to the axis. In this case the points between N and the axis may be supposed to constitute the image NP_1 of a luminous plane surface lying perpendicular to the axis; and this image, acting as object towards the lens system, gives rise to an image QP_2 of the same size and on the same side of the axis. The plane NP_1 drawn through N perpendicular to the axis is called the *first principal plane* of the system, the plane QP_2 drawn through Q perpendicular to the axis is called the *second principal plane* of the system. The point P_1 is called the *first principal point*, and P_2 is called the *second principal point*, of the system.

From the above reasoning the following laws may be deduced.

1. *The principal planes are planes of unit magnification.*

Rays converging so as to form an erect image in the first principal plane give rise to rays which diverge from an erect image in the second principal plane, both images being equal in size.

In some cases the first principal plane lies outside, and on the positive side, of the lens system. In this case a real object placed in the first principal plane would give rise to an image in the second principal plane of the same size, and on the same side of the axis, as the object. But when the first principal plane lies within the lens combination, the object must be a virtual one formed by converging rays, as stated above. If a real object were in this case placed in the first principal plane, the rays from it would not be refracted at the first surface of the lens system, and the reasoning used above would no longer apply.

It may happen that a plane virtual object formed in the first principal plane gives rise to a curved image, which, of course, cannot lie in the second principal plane—nor, indeed, in any plane. In this case the lens is defective, and the distortion of the image is due to spherical aberration. In what follows it will be assumed that spherical aberration is absent.

2. *Any ray initially directed toward a point in the first principal plane at a distance* h *from the axis will leave the lens system as if it proceeded from a point in the second principal plane at an equal distance* h *from the axis, and on the same side of it as the first point.*

Any ray contained in the converging pencil bounded by the rays KN and F_1N is directed toward N, and gives rise to a ray in the transmitted pencil bounded by QH and QF_2, which therefore apparently proceeds from Q; by construction, N and Q are equidistant from the axis, and on the same side of it.

The Focal Distances.—The distance measured from P_1, the first principal point, to F_1, the first principal focus, is defined as the *first focal distance* of the lens system. This will be denoted

by f'. If F_1 is on the positive side of P_1, then a positive sign must be affixed to the numerical value of the distance P_1F_1. If F_1 is on the negative side of P_1, a negative sign must be affixed to the numerical value of P_1F_1. The vector (or directed) distance from P_1 to F_1 is, however, in all cases denoted by f', so that the laws deduced will apply to lens systems of all kinds. On the other hand, the distance from F_1 to P_1 will in all cases be equal to $(-f')$, since it is measured in the opposite direction to P_1F_1 or f'. It is easily seen that f' will have a positive value when the lens system is convergent, while it will have a negative value when the lens system is divergent.

The distance measured from P_2, the second principal point, to F_2, the second principal focus, is defined as the *second focal distance* of the system; this will be denoted by f''. In expressing the value of f'' numerically, a positive or negative sign must be prefixed according as F_2 is on the positive or the negative side of P_2. Thus f'' will have a negative value for a convergent lens system, and a positive value for a divergent lens system.

When the medium through which the light travels after leaving the system has the same refractive index as the medium through which the light travels before reaching the system, the values of f' and f'' are numerically equal, and differ only in sign. The proof of this statement is as follows:—

It was proved in *The Practical Teacher* for June 1906, p. 658, that when a lens has air on both sides of it, the brightness of an image formed by the lens is equal to that of the corresponding object, if we suppose the lens to be transparent, and that no light is lost by reflection. Similar reasoning will apply to a lens with the same medium on both sides of it, whatever that medium may be. Thus the brightness of the virtual image P_2Q must be equal to that of the virtual object P_1N under these conditions. If we suppose the virtual object P_1N to consist of a number of luminous points distributed over a given area, then the virtual image P_2Q will consist of an equal number of luminous points distributed over an equal area, since image and object are equal in size. Thus for the image P_2Q to be as bright as the object, the rays from each luminous point of P_2Q must diverge in a cone exactly similar to that in which they would diverge from the corresponding point of the object P_1N if the lens system were removed. Thus the angle HQF_2 must be equal to the angle KNF_1; and since KN is parallel to F_1P_1, and HG is parallel to F_2P_2, it follows that the angles QF_2P_2 and NF_1P_1 are equal. Then, since $P_2Q = P_1N$, the triangles QF_2P_2 and NF_1P_1 are equal in all respects, and the numerical value of P_2F_2 is equal to that of P_1F_1.

When a lens or lens system is immersed in a uniform medium its second focal distance is often called its *focal length*.

It can be proved that when the medium on the negative side of the system has a refractive index n times as great as that of the medium on the positive side, then the second focal distance is numerically n times as great as the first focal distance. This follows from the fact that the image P_2Q will then be n^2 times as bright as the object P N (see *Light for Students*, p. 79); and since image and object are equal in size, the rays diverging from Q must be contained in a cone of which the solid angle at Q is $(1/n_2)$ times the solid angle of the cone converging toward N. (The solid angle of a cone is measured by the area of a section perpendicular to the axis, divided by the square of the distance of this section from the apex. See *Light for Students*, p. 15.) Thus the angle HQF_2 must have only $1/n$ of the value of the angle KNF_1.

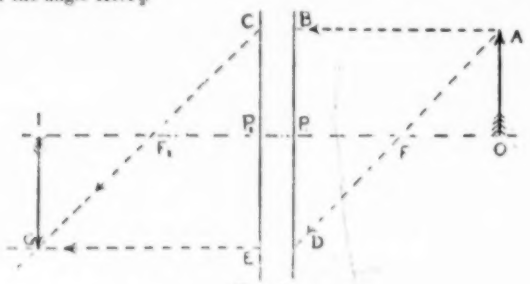


FIG. 2.

Graphical Construction of Image corresponding to any Object.—The properties of a lens system become completely known when the axis and the positions of the two principal foci and the two principal points are given. Let P_1, P_2 (Fig. 2) be the first and second principal points of a lens system, of which F_1 and F_2 are the first and second principal foci. Draw lines through P_1 and P_2 perpendicular to the axis, to represent sections of the principal planes. Let OA be an object perpendicular to the axis, and let it be required to determine the corresponding image formed by the lens system. This can be done as follows:—

From A draw AB parallel to the axis, intersecting the first principal plane in B. Then if AB represents a ray incident on the lens system, the corresponding emergent ray will appear to proceed from C, a point in the second principal plane, where $P_2C = P_1B$ (Law 2 above). Further, since AB is parallel to the axis, the corresponding ray from C will pass through F_2, by definition of the second principal focus F_2. Join CF_2, and produce indefinitely.

Join AF_1 by a straight line, and produce this till it cuts the first principal plane in D. Then if AD represents a ray incident on the system, the corresponding emergent ray will appear to proceed from E, where $P_2E = P_1D$. Further, since AD passes through the first principal focus F_1, the ray from E will be parallel to the axis. Draw EF parallel to the axis, and produce till it intersects CF_2 (produced) in G. Then G will be the image corresponding to the point A of the object. From G draw GI perpendicular to the axis; then IG is the image corresponding to the object OA.

On comparing this construction with that used in connection with a thin lens, it will be seen that for a thin lens the two principal planes coalesce into a single plane, the remainder of the procedure being the same in both cases.

Formula for a Thick Lens or Lens System.—We have just seen that when the principal points and the principal foci of a lens system are known, the position and size of the image corresponding to an object in any specified position can be found graphically. From this it follows that the position and size of the image can be calculated. In order to calculate the position of the image, we must select some fixed point on the axis from which the distance of the image can be measured, and we must also select some fixed point on the axis from which the distance of the object can be measured. In connection with a thin lens it is customary to measure the distances of the object and image from the lens itself; but the procedure is obviously unsuitable when we are dealing with a system of lenses separated by definite distances, since there is no reason why we should select one lens to measure from rather than any of the other lenses comprised in the system.

The fixed points (or *cardinal points*, as they are called) which define the properties of a lens system are the two principal points and the two principal foci. From these we must choose suitable points of reference. As we shall see presently, it is possible to use the two principal points as points of reference; but these points are not in general so easily located as the two principal foci, so that it is advantageous to select the latter as points of reference.

Let the distance from the first principal focus F_1 to the object be denoted by U, while the distance from the second principal focus F_2 is denoted by V. Thus in Fig. 2, $F_1O = U$, while $F_2I = V$. In giving numerical values to U and V, the ordinary convention as to signs is employed. Thus in Fig. 2, U will have a positive value, while V will have a negative value.

Let the distance from the axis to the extremity of the object be denoted by o, while the distance from the axis to the extremity of the image is indicated by i. If either of these is drawn downwards from the axis (as IG is in Fig. 2) a negative sign must be prefixed to its numerical value.

In Fig. 2 the triangles AF_1O and DF_1P_1 are similar, since they are both right-angled triangles, and the angles AF_1O and DF_1P_1 are equal. Hence

$$\frac{P_1D}{F_1P_1} = \frac{OA}{F_1O}.$$

Notice that the perpendiculars P_1D and OA must be measured from the bases of the corresponding triangles, while F_1P_1 and F_1O are measured from the corresponding angular points of the triangles.

Now $P_1D = IG = i$, while $F_1P_1 = (-P_1F_1) = -f'$, where f' is the first focal distance of the system. Also $OA = o$, while $F_1O = U$. Thus

$$-\frac{i}{f'} = \frac{o}{U}.$$

The ratio of i to o is called the *magnification*, and will be denoted by m. The image will be larger or smaller than the object according as the numerical value of m is greater or less than unity. When the object is erect, the image will be erect or inverted according as m has a positive or negative value.

$$m = \frac{i}{o} = -\frac{f'}{U} \quad \ldots\ldots\ldots \quad (1)$$

Similarly the triangles GF_2I and CF_2P_2 are similar, so that

$$\frac{IG}{F_2I} = \frac{P_2C}{F_2P_2}.$$

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$\therefore \frac{i}{V} = \frac{o}{-f''}$, since $P_2C = OA$, and $F_2P_2 = (-P_2F_2) = -f''$,

where f'' is the second focal distance of the system. Then

$$m = \frac{i}{o} = -\frac{V}{f''}. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

The value of m in (1) and (2) must, of course, be equal, so that

$$-\frac{f'}{U} = -\frac{V}{f''}.$$

$$\therefore UV = f'f''. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (3)$$

If the lens system has air on both sides of it, f'' will be equal to the focal length of the system, which we may denote by f, and f' will be equal to $(-f') = (-f)$. In this case

$$UV = -f^2. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (4)$$

Let u be the distance from the first principal point P_1 to the object, then $u = P_1O = P_1F_1 + F_1O = -f + U$. Let v be the distance from the second principal point P_2 to the image, then $v = P_2I = P_2F_2 + F_2I = f + V$. Thus

$$U = u + f,$$

$$V = v - f,$$

and substituting these values in (4), we obtain

$$(u + f)(v - f) = -f^2.$$

$$\therefore uv - uf + vf - f^2 = -f^2.$$

$$\therefore uf - vf = uv.$$

Dividing through by uvf, we obtain

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f},$$

a formula precisely similar to that which applies to a thin lens. The only difference in its application is, that in connection with a thin lens u, v, and f are measured from the lens itself, while in connection with a lens system u is measured from the first principal point, and v and f are measured from the second principal point. We have now investigated the theory of the formation of images by thick lenses or lens systems. In the next article of the series the methods of applying this theory to the practical determination of the cardinal points of a lens system will be explained.

MATHEMATICS.

(STAGES 2 AND 3.)

BY FRANK CASTLE, M.I.M.E.,

Royal College of Science; Lecturer on Mathematics, etc., Morley College; Author of "Elementary Practical Physics," "Practical Mathematics," etc.

Logarithms.—The definitions and theorems relating to logarithms are already either familiar to the reader or will not present many difficulties. The practical applications of logarithms to the processes of multiplication, division, involution, and evolution will ensure familiarity with this important section. The following typical examples will probably be amply sufficient for the purpose. If necessary, additional exercises, together with proofs of the more important theorems, may be obtained from any text-book on the subject.

The logarithm of a number to a given base is the index of the power to which that base must be raised to give the number.

Thus if $m = a^x$, then x is the logarithm of m to base a.

When the base is 10, then $m = 10^x$.

If x is 2, then $m = 10^2 = 100$, and 2 is the logarithm of 100 to base 10.

Similarly, as $8 = 2^3$, $\log_2 8 = 3$.

The logarithm of the product of two numbers is equal to the sum of the logarithms of the numbers.

Let m and n be two given numbers, then m and n are each equal to some power of 10.

$$\therefore m = 10^x, n = 10^y,$$

$$\text{or } \log m = x, \log n = y.$$

$$\therefore m \times n = 10^x \times 10^y = 10^{x+y},$$

$$\log (mn) = x + y = \log m + \log n.$$

$$\text{Similarly, } \frac{m}{n} = 10^{x-y},$$

$$\therefore \log \frac{m}{n} = x - y = \log m - \log n.$$

Or the logarithm of the quotient of two numbers is equal to the difference of the logarithms of the numbers.

In this manner it is seen that multiplication is replaced by addition, and division by subtraction. Similarly, involution is replaced by multiplication, and evolution by division.

Napierian Logarithms.—Due to the use of the decimal system, the logarithms to base 10 are chiefly used in arithmetical work, the advantages of this system being (1) that it is not necessary to print the characteristics of the logarithms; (2) the same mantissa serves for a series of numbers, but it should be carefully noted that in mathematics $\log x$ frequently means $\log_e x$, where the base $e = 2{\cdot}71828$.

The connection between Napierian or hyperbolic logarithms, as they are frequently termed, and logarithms to base 10 is readily obtained.

$$\text{Thus if } e^x = n = 10^n,$$

$$\text{then } x = \log_e n = n \log_e 10.$$

$$\text{Or } n = \log_{10} n = x \log_{10} e.$$

$$\text{So that } x = n \div \log_{10} e.$$

On reference to tables it will be found that the logarithm of e is $0{\cdot}43429$. Hence to obtain the Napierian logarithm it is only necessary to multiply the logarithm to base 10 by $2{\cdot}30258$, or divide by $0{\cdot}43429$.

Ex. 1. Find the Napierian logarithms of $0{\cdot}08$ and 4000.

Given $\log_e 2 = 0{\cdot}6931472$, $\log_e 5 = 1{\cdot}6094379$.

$$\text{Here } \log_e 0{\cdot}08 = \log_e \frac{8}{100} = \log_e \frac{2}{25}$$

$$= \log 2 - 2 \log 5 = 0{\cdot}6931472 - 2 \times 1{\cdot}6094379$$

$$= \bar{3}{\cdot}4742714.$$

$$\text{Log}_e 4000 = \log_e 4 + \log_e 1000$$

$$= 2 \log_e 2 + 3 \log_e 10$$

$$= 2 \log_e 2 + 3(\log_e 2 + \log_e 5)$$

$$= 8{\cdot}2940497.$$

Ex. 2. (*a*) Explain why the logarithm of the product of two numbers is equal to the sum of the logarithms of the numbers.

(*b*) By means of the given logarithms find the fifth root and the fifth power of $0{\cdot}69889$, correct to five decimal places.

(*c*) If $4 \log_{10} x + 7 = 0$, find x.

(*d*) If $y \log_{10} 0{\cdot}0424 = \log_{10} 0{\cdot}2165$, find y to four places of decimals. (1906.)

(*b*) From the given tables

$$\log 0{\cdot}69889 = \bar{1}{\cdot}8444088.$$

To obtain the fifth power it is necessary to multiply by 5.

$$\therefore \bar{1}{\cdot}8444088 \times 5 = \bar{1}{\cdot}2220440.$$

From given tables

$$\log 16675 = {\cdot}2220658$$

$$\log \quad 74 = \quad 0398$$

$$\text{Diff.} = \quad 260$$

Also $\cdot 2220440$

$$\frac{0398}{42} \text{ and } \frac{4200}{260} = 16.$$

$$\therefore (0{\cdot}69889)^5 = 0{\cdot}1667416.$$

It will be noticed that $\log 16675$ and $\log 16674$ are written immediately under each other, also as $\log 16675 = {\cdot}2220658$ and $\log 16674 = 2220398$, it is only necessary to write down the last few figures in each case.

In a similar manner, to obtain the fifth root, it is necessary to divide by 5.

$$\therefore \bar{1}{\cdot}8444088 \div 5 = \bar{1}{\cdot}9688817.$$

From given tables

$$\log 93086 = 9688844$$

$$\log 93085 = \quad 8797$$

$$\quad 47$$

Also 9688817

$$\frac{8797}{20} \qquad \therefore \frac{2000}{47} = 42.$$

$$\therefore \sqrt[5]{0{\cdot}69889} = 0{\cdot}9308542.$$

(*c*) $4 \log_{10} x + 7 = 0.$

$$\therefore \log x = -\frac{7}{4} = -1{\cdot}75 = \bar{2}{\cdot}25.$$

From given tables

$$\log 17783 = 2500050$$

$$82 = \quad 99806$$

$$\quad 244$$

Also 2500000

$$\frac{99806}{194} \qquad \therefore \frac{19400}{244} = 79.$$

Hence $x = 0{\cdot}01778279$.

(*d*) $y \log_{10} 0{\cdot}0424 = \log_{10} 0{\cdot}2165.$

$$\therefore y = \frac{\log 0{\cdot}2165}{\log 0{\cdot}0424} = \frac{\bar{1}{\cdot}3354579}{\bar{2}{\cdot}6273659}$$

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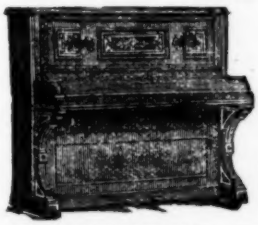

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$$= \frac{0{\cdot}6645421}{1{\cdot}3726341} = 0{\cdot}4841.$$

Ex. 3. If $a^2 + b^2 = 11ab$, show that

$$\log \frac{a-b}{3} = \tfrac{1}{2}(\log a + \log b). \qquad (1902.)$$

If $a^2 + b^2 = 11ab$,
then $a^2 + b^2 - 2ab = 9ab$,
or $(a-b)^2 = 9ab$.
$\therefore a - b = 3\sqrt{ab}$,
or $\frac{a-b}{3} = \sqrt{ab}$.
$\therefore \log \frac{a-b}{3} = \tfrac{1}{2}(\log a + \log b)$.

Ex. 4. (*a*) Find by logarithms the cube root of $5 \div 2\pi$.

(*b*) If $N = \sqrt{10} \times \sqrt[3]{10} \div \sqrt[4]{10}$, find the common logarithm of N. (1902.)

(*a*) $\log \sqrt[3]{\frac{5}{2\pi}} = \log \sqrt[3]{\frac{10}{4\pi}}$
$= \tfrac{1}{3}(1 - 2\log 2 - \log \pi) = \bar{1}{\cdot}9669300.$
$\therefore \sqrt[3]{\frac{5}{2\pi}} = 0{\cdot}9266816.$

(*b*) $N = \sqrt{10} \times \sqrt[3]{10} \div \sqrt[4]{10}$.
$\therefore \log N = \frac{1}{2}\log 10 + \frac{1}{3}\log 10 - \frac{1}{4}\log 10$
$= \frac{1}{2} + \frac{1}{3} - \frac{1}{4} = \frac{7}{12}$.

Ex. 5. Define the logarithm of a given number to an assigned base.

State and prove the rule for extracting the square root of a given number by logarithms. Write down the logarithms (with positive mantissæ) of the following numbers:—

(*a*) 13, (*b*) 1300, (*c*) $\frac{1}{13}$, (*d*) $\sqrt{\frac{1}{13}}$.

(*e*) Find the numerical value of $\sqrt[3]{\frac{5}{13}}$. (1901.)

Ans. (*c*) $\bar{2}{\cdot}9208187$, (*d*) $\bar{1}{\cdot}8829583$, (*e*) $0{\cdot}727236$.

Ex. 6. (*a*) State and prove the rule for extracting the cube root of a given number by logarithms.

(*b*) What number is the base of the common logarithms? Why is that number used for that purpose?

(*c*) If $N = \sqrt{10} \times \sqrt[3]{10} \div \sqrt[4]{10}$, find the common logarithm of N. (1902.)

Ans. (*c*) $7 \div 12$.

Ex. 7. (*a*) Find the logarithms (with a positive mantissa in each case) of

$\sqrt[3]{84}$, $\sqrt{0{\cdot}0125}$, $(1{\cdot}08)^4 \div (0{\cdot}0147)^3$.

(*b*) Find to three places of decimals the value of x which satisfies the equation $15x = 20$. (1898.)

Ans. (*b*) $x = 1{\cdot}\dot{3}$.

Ex. 8. Find the logarithms of

$$\frac{15}{\sqrt{91}}, \quad \frac{1{\cdot}025}{(0{\cdot}927)^2}, \quad \sqrt{0{\cdot}0013}. \qquad (1898.)$$

Ans. $0{\cdot}1965706$, $3{\cdot}1479961$, $\bar{2}{\cdot}5569717$.

Ex. 9. Show that the sum of the logarithms of two numbers equals the logarithm of the product of the numbers. (1899.)

Ex. 10. (*a*) Define logarithm, base, characteristic, mantissa.

(*b*) Find x, having given that $\frac{2}{3}$ is the logarithm of x to the base 8.

(*c*) Find the common logarithm of the square root of $0{\cdot}00119$, and calculate the numerical value of $(0{\cdot}084)^{\frac{1}{3}} \div (0{\cdot}34)^3$. (1899.)

Ans. (*b*) 4, (*c*) $\bar{2}{\cdot}5377735$, $15{\cdot}5031$.

Ex. 11. (*a*) Show that $\log_a \frac{m}{n} = \log_a m - \log_a n$.

(*b*) Find the logarithm (with a positive mantissa) of
$0{\cdot}049 \div 14{\cdot}4$.

(*c*) Find the numerical value of the ratio of the fourth power of $2{\cdot}24$ to the fifth root of 147. (1899.)

Ans. (*b*) $\bar{3}{\cdot}5318334$, $9{\cdot}279542$.

Ex. 12. (*a*) Define the logarithm of a number to a given base, and state what are the practical advantages of taking 10 as the base of a system of logarithms.

(*b*) Explain how it is that $\log(a^3) = 3\log a$.

(*c*) Using the given table of logarithms, find log 36, and the numerical value of the fifth root of $1{\cdot}125$. (1903.)

Ans. (*c*) $1{\cdot}5563026$, $1{\cdot}0238363$.

Ex. 13. Define a logarithm.

Illustrate the rule that $\log \frac{b}{a} = \log b - \log a$ by taking common logarithms and letting $b = 1000$, $a = 10$, and proving that the rule is true in this case.

Find by logarithms the numerical values of

$$(a)\ (2{\cdot}45)^{10}, \quad (b)\ \left(\frac{2}{7}\right)^{\frac{5}{8}}. \qquad (1904.)$$

Ans. $7792{\cdot}2$, $0{\cdot}4715841$.

Ex. 14. (*a*) Define a logarithm.

Reasoning from your definition, find the logarithm of 81 to base 3, and the logarithm of $\frac{1}{4}$ to base 2.

(*b*) By means of the tables find the common logarithm of $0{\cdot}00144$.

(*c*) Find the numerical value of

$$6^{\frac{1}{3}} \times 12^{\frac{1}{5}} \div 125^{\frac{1}{4}}. \qquad (1905.)$$

PHYSIOGRAPHY.

(STAGES 2 AND 3.)

Typical Examination Questions.

What are the conditions that lead to the formation of snow and hail respectively? State what you know concerning the structure of snowflakes and hailstones.—Snow is probably formed by the direct passage of water vapour into the solid state without passing through the liquid state. A well-known case of a vapour passing into the solid state without first becoming liquid is the case of iodine when it sublimes. In the same way water vapour, under suitable conditions, is capable of passing into the solid state without liquefying. The ideal conditions for this is for air saturated with water vapour just below 0° C. to be cooled further. A portion of the small quantity of aqueous vapour in the air will be precipitated in the solid form. It does not, however, seem always necessary for these conditions to be fulfilled for snow to be formed, as a cold current of air meeting a current of comparatively warm moist air will often cause snow to be produced.

Hail seems sometimes to be formed by the passage of rain-drops through air colder than that in which they were formed, causing them to become solid. Once formed, the hailstones may grow larger as they pass through the air. Snowflakes are really water crystals, and belong to the hexagonal system. If during a fall of snow the air is still, exquisitely-formed snow crystals may be obtained. Sometimes they are rods or scales with six sides, sometimes hexagonal pyramids; but more usually they are star-shaped, each having a central nucleus of ice from which radiate six radial rods or branches arranged at regular intervals around the nucleus.

Hailstones are generally nearly spherical, as though they were frozen rain-drops. If we break them open, we find that they sometimes consist of crystals spreading out in all directions from the centre to the circumference, while sometimes they consist of concentric layers of ice—some clear, some opaque—around a central white mass, from which we infer that they have grown by the deposition of layers of fresh material in succession.

Give a short account of the phenomena exhibited by pitchblende and substances derived from it.—Pitchblende is a mineral which is found in Cornwall and in various parts of the continent of Europe. It consists very largely of uranium, but also contains lead and iron in moderate quantities, and also slight traces of polonium, radium, and actinium. It is to the three latter that pitchblende owes its great interest, and especially to the radium.

A piece of pitchblende shows considerable radio-activity. If a piece of pitchblende is placed on a box or paper packet containing an undeveloped photographic plate, and left there for a considerable time, it will be found, on afterwards developing the plate, that the plate has been affected as though it had been exposed to light.

Professor Curie and Madame Curie investigated the matter, and showed that the pitchblende contained two new elements—actinium and polonium—which they were unable to isolate in a state of purity, and a third one, which they succeeded in obtaining practically pure in the form of one of its salts. This third element was exceedingly radio-active, and they called it radium. It belongs to the barium group, with which it is precipitated. A small quantity of a radium compound, brought near an electrically-charged body, causes it quickly to lose its charge, and this seems to be due to electrically-charged particles which are shot off from the radium itself. Radium seems to give off three kinds of emanations or rays.

The "α" rays seem to consist of particles of matter charged with positive electricity, for they discharge an electroscope charged with negative electricity. These rays are very easily stopped by a thin sheet of aluminium.

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NORMAL CORRESPONDENCE COLLEGE, 47 MELFORD ROAD, EAST DULWICH, S.E.; 110 AVONDALE SQUARE, LONDON, S.E.

The "β" rays seem to be particles of matter carrying charges of negative electricity, for they discharge a positively charged conductor. They are able to penetrate a very considerable thickness of aluminium and other opaque bodies.

The "γ" rays, although small in number, are much more penetrative even than the "β" rays. They seem to be of the same nature as the Röntgen or X-rays. The "α" and "β" rays are deflected by a magnetic field, while the "γ" rays are not. The "α" rays travel with a velocity of about 15,500 miles per second, and the "β" rays about 186,000 miles per second. Professor Ramsay contends that the "α" rays are electrically-charged atoms of helium, for he has shown that after a time they give the spectrum of helium.

Radium always maintains itself at about 1·5° C. above the temperature of its surroundings. These phenomena are probably due to the radium gradually breaking up into elements of smaller atomic weight.

Radium is self-luminous, and also causes a screen covered with crystals of hexagonal zinc sulphide to glow, due to the bombardment of its surface by the particles of matter from the radium. Radium seems to destroy most kinds of living tissue, and is bactericidal. Actinium and polonium, although radio-active, are very feebly so compared with radium.

CHEMISTRY.

(ADVANCED AND HONOURS.)

BY C. A. WEST, B.SC., A.R.C.S., F.I.C.

Typical Examination Questions.

1. How would you prove that ammonia is composed of nitrogen and hydrogen, and that its molecular formula is NH_3?—Ammonia at a temperature just below a red heat is broken up into its elements, so that if we pass ammonia gas through a red-hot tube decomposition takes place. Perhaps the best way to show that nitrogen and hydrogen are the products of the decomposition is to enclose a measured quantity of ammonia in a eudiometer tube over mercury, and pass electric sparks through the gas for some time. On readjusting the levels of the mercury, it is found that the volume of the gas has been doubled. Having measured the volume of the gas, we now introduce a quantity of oxygen, and again pass a number of sparks. The oxygen combines with a portion of the gas (the hydrogen), and forms water. More oxygen should be added, and the sparking continued until all the hydrogen has been used up. When no more hydrogen is left, further sparking will produce no further diminution in the volume of the gases. The excess of oxygen can now be removed by absorption with a solution of pyrogallic acid in caustic potash. When the pressure has been again adjusted, we find that the volume of the gas left is half that of the ammonia originally taken, or one quarter of the volume of the gases resulting from the decomposition of the ammonia by sparking. The residual gas can be proved to be nitrogen, for it is not acted on by acids or alkalies, and it neither burns nor supports combustion.

The gas which combines with the oxygen forming water is hydrogen. Evidently from the measurements of the volumes of the gases, we are justified in stating that two volumes of ammonia yield three volumes of hydrogen and one of nitrogen, and that the hydrogen and nitrogen are present in the proportions represented by the formula NH_3. The molecular formula will therefore be NH_3, N_2H_6, N_3H_9, or some other multiple of NH_3. If the molecular formula were N_2H_6, then two volumes of ammonia would yield two volumes of nitrogen, but our experiment shows only one volume of nitrogen. Hence the molecular formula must be NH_3.

Another way of proving that the formula is NH_3, and not any multiple of this, is to determine the density of the gas, which is found to be 8½. This agrees with that calculated from the formula NH_3—namely,—

$$\frac{14 + 3}{2} = 8{\cdot}5.$$

If 10 litres of carbon monoxide at 0° and 760 mm. are burned, what volume of oxygen at the same temperature and pressure will be consumed, and what will be the volume of carbon dioxide if measured at 15° and 740 mm.?—The chemical reaction which takes place when carbon monoxide is burned in oxygen is represented by the equation

$$2CO + O_2 = 2CO_2.$$

As will be seen from the equation, two volumes of carbon monoxide will combine with one volume of oxygen, and two volumes of carbon dioxide will result. Hence, at the same temperature and pressure, 10 litres of carbon monoxide will require 5 litres of oxygen. At the same temperature and pressure, also, the resultant carbon dioxide will measure 10 litres. If, however, the temperature is changed from 0° to 15°, and the pressure changed from 760 mm. to 740 mm., the volume will be altered, and the new volume may be calculated from the formula

$$\frac{V'P'}{T'} = \frac{VP}{T},$$

where V′ and V represent the new and old volumes respectively, P′ and P the pressures, and T′ and T the temperatures on the absolute scale. Hence

$$V' = \frac{VPT'}{PT} = \frac{10 \times 760 \times 288}{740 \times 273} \text{ litres} = 1083{\cdot}45 \text{ cc.}$$

How is hydrogen peroxide prepared? What impurities are likely to be present in the commercial aqueous solution of the shops, and how can they be removed? How would you detect a small quantity of hydrogen peroxide in a solution?—Hydrogen peroxide is usually prepared from barium peroxide, which itself is prepared indirectly from barium carbonate, which occurs naturally.

The carbonate is treated with nitric acid, and barium nitrate formed. The solution is concentrated, and the nitrate crystallised. The nitrate is strongly heated and converted into the monoxide, oxygen, nitrogen, and nitrogen peroxide being formed at the same time. The barium monoxide is then heated to a low red heat in a tube, and a stream of oxygen or air, free from carbon dioxide, passed over it. Barium peroxide is thus formed. The barium peroxide is then made into a paste with water, and slowly added to cooled dilute sulphuric acid until the acid has been nearly neutralised. The acid remaining is then carefully neutralised by adding baryta-water. The barium sulphate formed is removed by filtration, and the solution of hydrogen peroxide concentrated by being placed over sulphuric acid *in vacuo*.

The reaction between the barium peroxide and the sulphuric acid is represented by the equation

$$BaO_2 + H_2SO_4 = BaSO_4 + H_2O_2,$$

and that between the sulphuric acid and baryta-water by

$$Ba(OH)_2 + H_2SO_4 = BaSO_4 + 2H_2O.$$

When hydrogen peroxide is prepared on a large scale for commercial purposes, phosphoric acid is generally employed instead of sulphuric acid, as it is found that a little phosphoric acid left in the solution tends to stop the decomposition of the hydrogen peroxide.

The chief impurity in the commercial solution will usually be found to be sulphuric acid or phosphoric acid. Either of these may be removed by adding baryta-water gradually, as long as any precipitate is formed. The precipitated barium sulphate or phosphate may then be filtered off. To test for a small quantity of hydrogen peroxide, add a little chromic acid or solution of potassium bichromate mixed with dilute sulphuric acid. A bright blue colour is produced, probably due to a higher oxide of chromium. If the solution is shaken up with a little ether, the coloured compound is concentrated in the ether in which it is soluble, and is thus rendered more evident.

A mineral contains sodium 32·79 per cent., aluminium 13·02 per cent., fluorine 54·09 per cent. Calculate its simplest formula, using the following atomic weights—Na = 23·05, Al = 27·1, F = 19. Give the details of your calculation.—Dividing the percentage of each element concerned by its atomic weight, we get

$$\text{Na } \frac{32{\cdot}79}{23{\cdot}05} = 1{\cdot}42,$$

$$\text{Al } \frac{13{\cdot}02}{27{\cdot}1} = {\cdot}48.$$

$$\text{F } \frac{54{\cdot}09}{19} = 2{\cdot}85.$$

Dividing each quotient by the approximate G.C.M. ·5, we get

$$\text{Na } \frac{1{\cdot}42}{{\cdot}5} = 3 \text{ approximately.}$$

$$\text{Al } \frac{{\cdot}48}{{\cdot}5} = 1 \quad ,,$$

$$\text{F } \frac{2{\cdot}85}{{\cdot}5} = 6 \quad ,,$$

The formula will therefore be Na_3AlF_6. This may be written $3NaF, AlF_3$.

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THE BABES IN THE WOOD.
(*From Miss C. I. Dodd's "Nature Studies and Fairy Tales."*)

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THE LITTLE FIR TREE.
(*From Miss C. I. Dodd's "Nature Studies and Fairy Tales."*)

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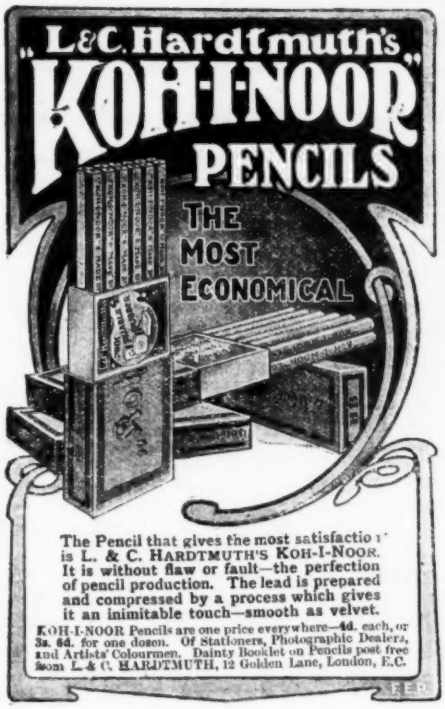

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